THE NIGERIAN RICE ECONOMY IN A COMPETITIVE WORLD:
CONSTRAINTS, OPPORTUNITIES AND STRATEGIC CHOICES

Nigeria's Rice Economy: State of the Art

By

Godwin Akpokodje, Frederic Lançon and Olaf Erenstein[1]

November 2001

West Africa Rice Development Association (WARDA)[2]
Bouake, Côte d'Ivoire

[1] Authors are respectively visiting scientist at WARDA-Ibadan and policy and production economists at WARDA-Bouake.

[2] The study is part of a USAID-funded project and implemented by WARDA. The views expressed in this report are those of individual scientists and do not necessarily reflect the views of USAID or WARDA.

Table of contents

1 Introduction

Nigeria is Africa's most populous country with 124 millions inhabitants in 1999 and has the potential to become Africa's economic powerhouse. However, to achieve this potential role Nigeria still faces numerous challenges. To its merit, Nigeria now has taken a number of these challenges head on and is trying to establish itself both as a participatory democracy and a market-based economy on the world stage. It is in the interest of the international community to ensure Nigeria is successful in this venture. In this regard, equitable and sustainable economic development is a prerequisite.

Equitable and sustainable economic development cannot ignore basic food commodities, particularly in developing countries such as Nigeria. Basic food commodities play an essential role in economic development as their availability and cost impinge directly on food security, expenditures and incomes of households, particularly amongst the poorer segments of population - both rural and urban. Of all the basic food commodities, rice is of particular importance.

Rice has traditionally been an important basic food commodity for certain populations in Sub-Saharan Africa, and West Africa in particular. Recent important and major changes have led to a structural increase in rice consumption in the sub-region. Since 1973, regional demand has grown at an annual rate of 6%, driven by a combination of population growth and substitution away from traditional coarse grains. The consumption of traditional cereals, mainly sorghum and millet, has fallen by 12 kg per capita, and their share in cereals used as food decreased from 61% in the early 1970s to 49% in the early 90s. In contrast, the share of rice in cereals consumed has grown from 15% to 26% over the same period.

Growth in regional rice consumption remains high. The FAO projects the annual growth rate will be 4.5% through the year 2000. This means that the total volume of rice consumed in West Africa is likely to increase by 70% over this decade.

The demand for rice has been increasing at a much faster rate in Nigeria than in other West African countries since the mid 1970s (Table 1). For example, during the 1960's Nigeria had the lowest per-capita annual consumption of rice in the sub-region (average of 3 kg). Since then, Nigerian per-capita consumption levels have grown significantly at 7.3% per annum. Consequently, per-capita consumption during the 1980's averaged 18 kg and reached 22 kg in 1995-1999. Despite the catching up of per-capita consumption with respect to the rest of West Africa, Nigerian consumption levels still lag the rest of the sub-region (34 kg in 1995-1999). Consequently, above average growth rates in Nigerian per capita rice consumption are likely to continue for some time.

A combination of various factors seems to have triggered the structural increase in rice consumption. Like elsewhere in West Africa, urbanization appears to be the most important cause of the shift in consumer preferences towards rice in Nigeria. Rice is easy to prepare compared to other traditional cereals, thereby reducing the chore of food preparation and fitting more easily in the urban lifestyles of rich and poor alike. Rice indeed is no longer a luxury food in Nigeria and has become a major source of

calories for the urban poor. For example, the poorest third of urban households obtain 33% of their cereal-based calories from rice, and rice purchases represent a major component of cash expenditures on cereals (World Bank, 1991). Data from several states in Nigeria demonstrate that rice availability and rice prices have become a major welfare determinant for the poorest segments of the countries' consumers who also are least food secure.

Table 1: Rice trends in Nigeria and the rest of West Africa

Indicators	Trend 61 - 75	Trend 75 - 83	Trend 83 - 95	Trend 95 - 99	Means 61 - 75	Means 75 - 83	Means 83 - 95	Means 95-99
Nigeria								
Production	8.8	22.0	8.6	2.1	332 800	806 222	2 306 794	3 189 833
Import	7.4	53.6	-2.2	24.6	2 036	420 756	334 974	525 307
Self-reliance ratio	0.0	-2.3	2.9	-3.3	99%	54%	77%	79%
Total consumption	9.8	21.6	6.4	15.7	178 199	833 640	1 599 609	2 248 113
Per capita consumption	7.0	18.3	4.6	12.8	3	12	18	22
West Africa without Nigeria								
Production	3.7	-0.8	3.6	5.2	1 779 376	2 344 073	2 822 635	4 041 384
Import	3.0	21.6	4.2	3.3	416 183	894 073	1 760 884	2 107 146
Self-reliance ratio	0.0	-7.4	0.0	6.2	65%	56%	42%	50%
Total consumption	3.8	7.5	3.8	5.8	1 178 753	1 950 821	2 973 885	3 985 721
Per capita consumption	1.3	4.7	0.6	1.7	21	27	30	34

Source: computed from FAO-Agrostat.

Rice production in Nigeria has boomed too during the aforementioned period (+9.3% per annum), particularly as a result of vast increases in rice area (+7.9% per annum) and to a lesser extent through increases in rice yield (+1.4% per annum). Notwithstanding, the production increase was insufficient to match the consumption increase - with rice imports making up the shortfall. Actual quantities imported have oscillated widely over this period, but lately have surged from 300,000 Mt in 1995 to 687,925,000 Mt in 1998. These imports are procured on the world market and represent a substantial cash outlay for the Nigerian economy, amounting to a whopping US$ 259 millions in 1998.

Because rice has become a strategic commodity in the Nigerian economy' the Nigerian government has actively interfered in the Nigerian rice economy over the last thirty years. However, policy has not been consistent. It has included oscillating import tariffs and import restrictions. For instance, from 1986 to the mid-1990s imports were illegal. In 1995 imports were allowed at a 100% tariff. In 1996 the tariff was reduced to 50% but increased to 85% in 2001. The erratic policy reflects the dilemma of securing cheap rice for consumers and a fair price for producers. Notwithstanding the various policy measures, domestic rice production has not increased sufficiently to meet the increased demand. Even during the rice import ban period, Nigeria was still importing several hundreds thousands tons of rice per year through illegal trade. With the removal of the rice import ban, consumption resume its rapid growth (Table 1) taking advantage of the downward trends of rice price on the world market.

This fluctuation and limited capacity of the Nigerian rice economy to match the domestic demand has raised a number of pertinent questions both in the policy circle and amongst researchers. What are the factors explaining that domestic rice production lag behind the demand for the commodity in Nigeria? What role has government policy played in engendering the present rice scenario? Which strategy could lead to a sustainable contribution of the Nigerian rice economy to the national food-security within a competitive and open economy.

WARDA has launched with its Nigerian partners and US-AID financial support a special project to further investigate these questions. The project relies on the analysis of existing and available information, complemented by the collection of additional information to fill eventual knowledge gaps. The goal is to formulate a feasible strategy to enhance the competitiveness of Nigerian rice producers through research and a policy dialogue so as to build a shared vision among stakeholders.

This paper provides a review of the available information on the Nigerian rice economy. The specific objectives of the study are:

- to characterize Nigeria's rice economy;
- to document and analyze the major trends and features of the rice economy;
- to identify gaps and areas for further research.

Information utilized in the study were obtained mainly from within the country. The major sources of information were secondary data and literature obtained from various institutions such as the various Universities and Research Institutes, Ministry of agriculture and data generating bodies such as the Federal Office of Statistics (FOS), National Agricultural Extension Research and Liaison Services (NAERLS), Project Coordinating Unit (PCU), Federal Department of Agriculture (FDA) and the Central Bank of Nigeria (CBN). However, where pertinent information are not available locally, recourse was made to international sources such as the Food and Agricultural Organization (FAO). In addition, expert consultations were made with rice policy makers, researchers, millers, farmers, importers, distributors and consumers of rice.

After this introduction, the paper initially focuses in section 2 on the Nigerian rice trends at an aggregate level of production, consumption and trade and among the different regions. The following sections look at the rice economy at the micro-level. Section 3 focuses on production; it looks at the characteristics of the various rice-based systems encountered in Nigeria and then at the profitability of the various systems. Section 4 focuses on downstream operations: marketing and processing. The final section reviews the Nigerian policy environment – both in terms of rice specific policy and general policies that affect rice. It thereby reviews various relevant government programs and projects and assesses the implications of the macro-economic policies on the rice sector.

2 Trends in Nigeria's Rice Economy

2.1 Rice production

Rice is cultivated in virtually all the agro-ecological zones in Nigeria. Despite this, the area cultivated to rice still appears small. In 2000, out of about 25 million hectares of land cultivated to various food crops, about 6.37% was cultivated to rice. Figure 1 shows that paddy rice production in Nigeria first experienced a boom in 1967 when output stood at 385 thousand tons. During this period, area cultivated to rice stood at 262 thousand hectares while average national yield was 1.47 tons per hectare (Figure 2). Another significant improvement in rice production in Nigeria occurred in 1980 when output increased to 1 million tons while area cultivated and yield rose to 550 thousand hectares and 1.98 tons per hectare respectively. Throughout the 1980s, rice output and yield increased. But in the 1990s, while rice output increased, the yield of rice declined, suggesting extensive rice cultivation.

Figure 1: Area Cultivated (ha) and Rice Output (ton) in Nigeria

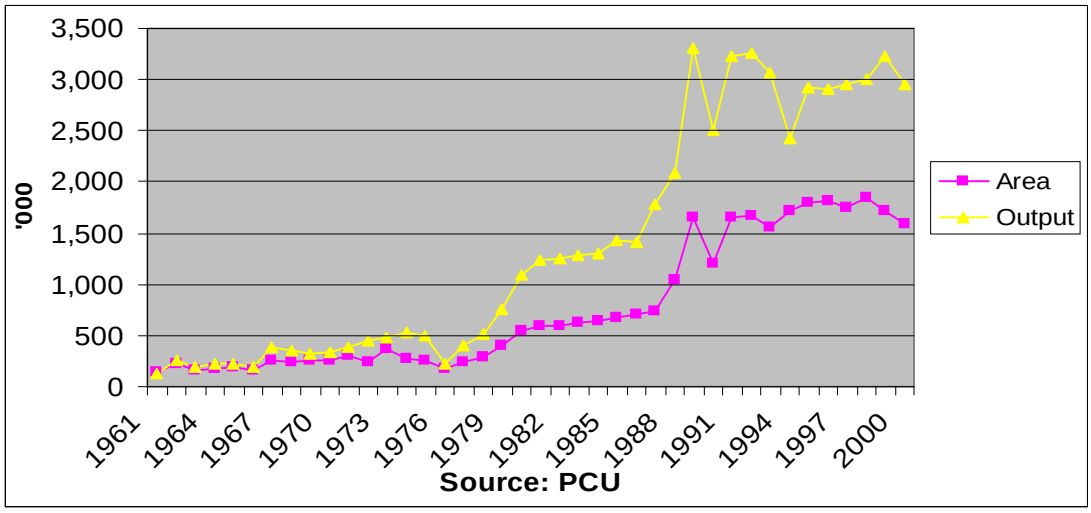


Figure 2: Yield of rice in Nigeria

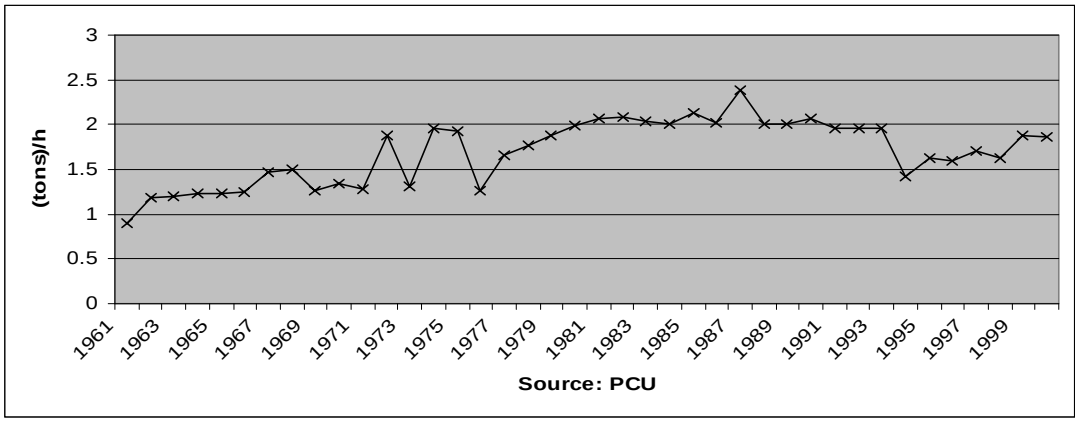
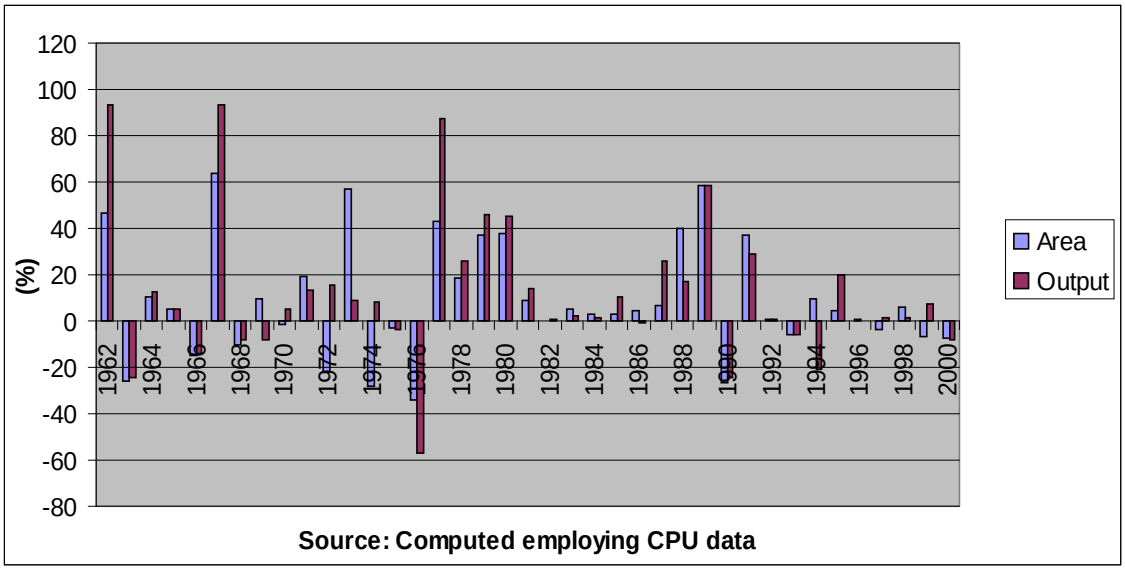


Figure 3 shows that growth in rice output oscillated in the 1960s with no clear-cut pattern. Output growth increased in the early 1970s but declined in the mid 70s before

picking up again in 1977. Growth in output declined between 1981 and 1983 and remained virtually stable at a zero growth rate till 1984. After the ban on rice importation in 1985, the figure shows that growth in output rose between 1987 and 1989 before declining in 1990. The figure shows that since the removal of the ban on imports in 1995, the growth in rice has consistently been on the decline, with growth being negative in 2000.

Figure 3: Growth in Area Cultivated and Output



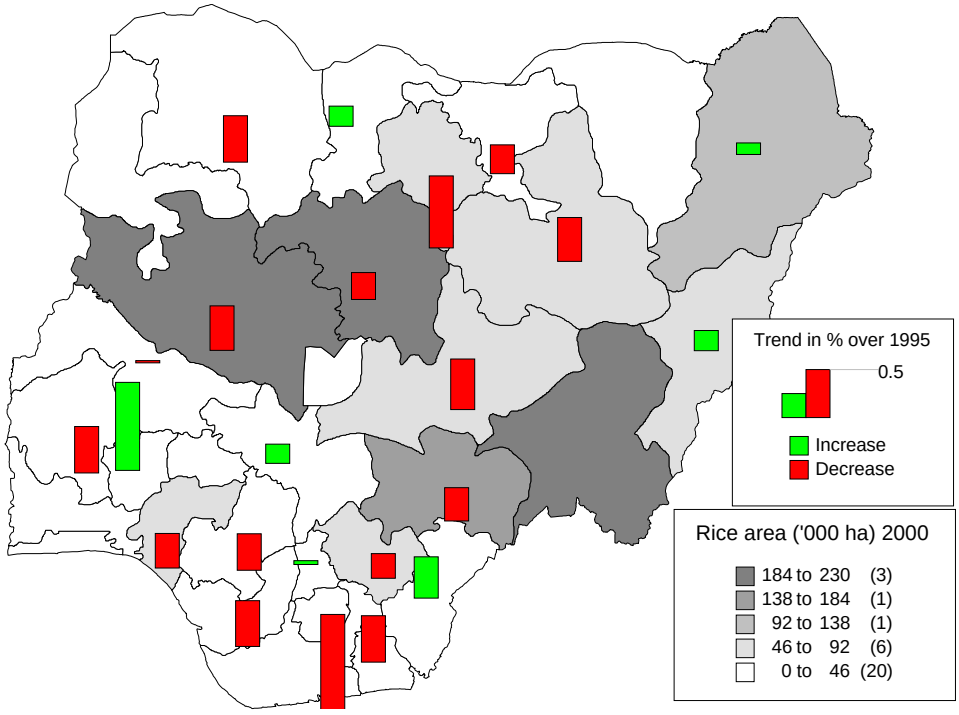
Source: Computed employing CPU data

There is a great disparity between the states of the federation in rice production both in terms of output and yield. In 2000, Kaduna state was the largest producer of rice, accounting for about 22% of the country's rice output. This was followed by Niger state (16%), Benue state (10%) and Taraba state (7% - see Annex 1-Table 20 and Figure 4). During the dry season, Benue state accounted for the highest output (61%). On a geographical zone basis, Figure 5 shows that, the Central zone was the largest producer of rice in Nigeria, accounting for 44% of total rice output in 2000. This was followed by the North West (29%) while the South West was the least (4%). In terms of trend most of the producing zones have experienced a decrease in their cropped area between 1995 and 2000, between 20% to 40%, the major one being recorded in Imo and Kano states. Only a 6 states, Osun, Kogi, Cross rive, Borno, Adamwara and Katsina have increased their rice cropped areas during the last five years.

A great variation also exists between the states in terms of yield. The average national rice yield during the dry season (3.05 tons/ha) was higher than that of the wet season (1.85 tons/ha - Annex 1:Table 20). This could be a confirmation of the higher yield acclaimed to be associated with irrigated rice production system. During the wet season there is considerable variation between states. States with relatively high yields include Enugu (3 tons/ha), Imo (2.7 tons/ha), and Ebonyi (2.5 tons/ha). For the dry season, Benue (3.6 tons/ha) and Adamawa (3.3 tons/ha) had yield higher than the national average (Figure 7). As already noted, the relatively higher yield during the dry season could be partly due to irrigation. On a zonal basis, Figure 6 shows that during

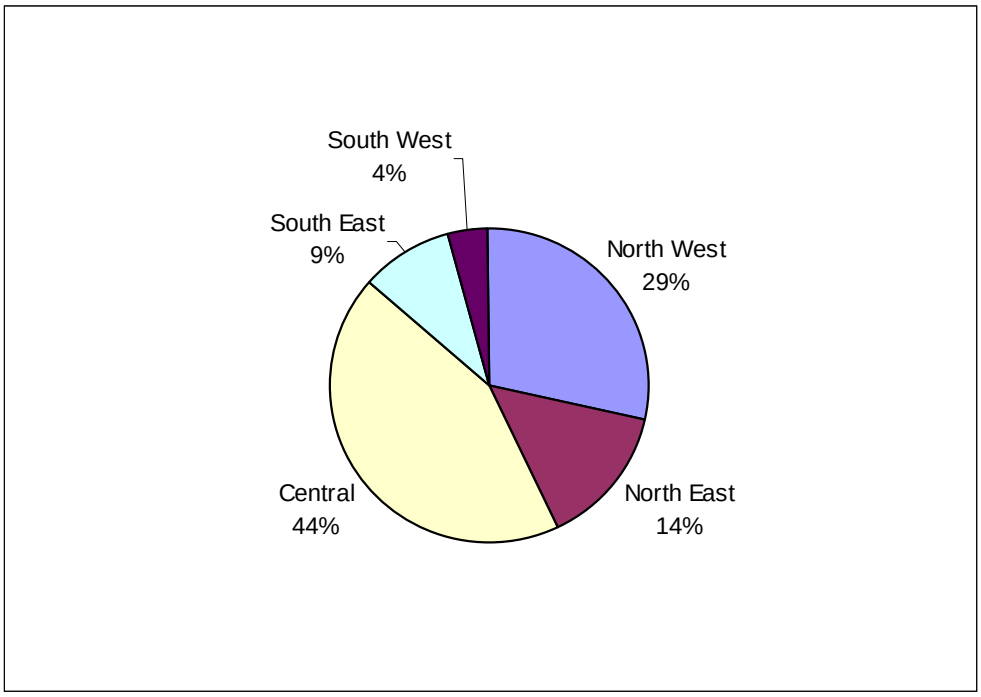
the wet season, the yield of rice was highest in South East (2.4 tons/ha). This was followed by the North East (2.0 ton/ha) and the Central zone (1.8 tons/ha) while the South West had the least (1.4 tons/ha). For the dry season, the figure indicates that yield was highest in the Central zone (3.6 tons/ha) but lowest in the North West (1.74 tons/ha).

Figure 4: Rice cropped area by state in 2000.



Source: PCU, 2000.

Figure 5: Distribution of Nigeria's Rice Output by Zone (2000)



Source: PCU, FMARD, 2001

Figure 6: Rice Yield in Agroecological Zones in Nigeria (2000 Wet and Dry Season)

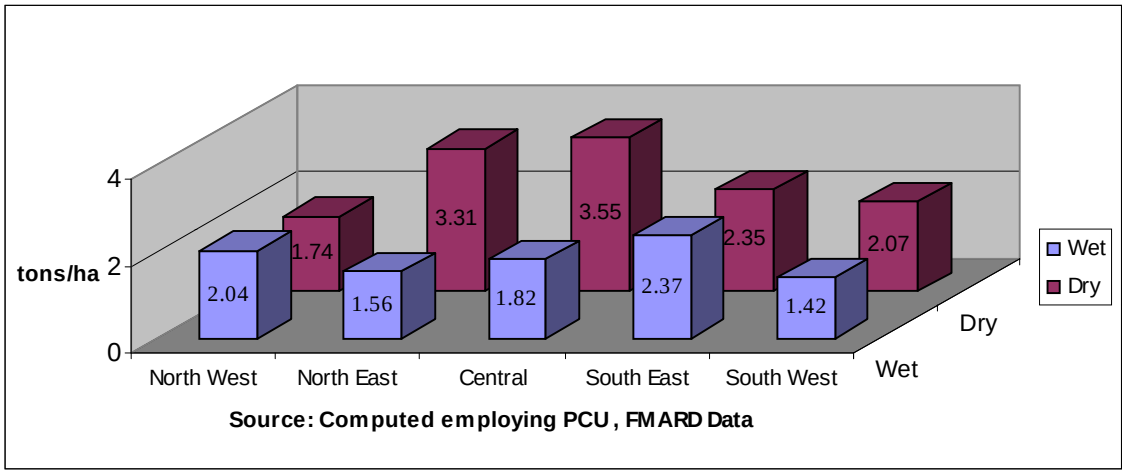
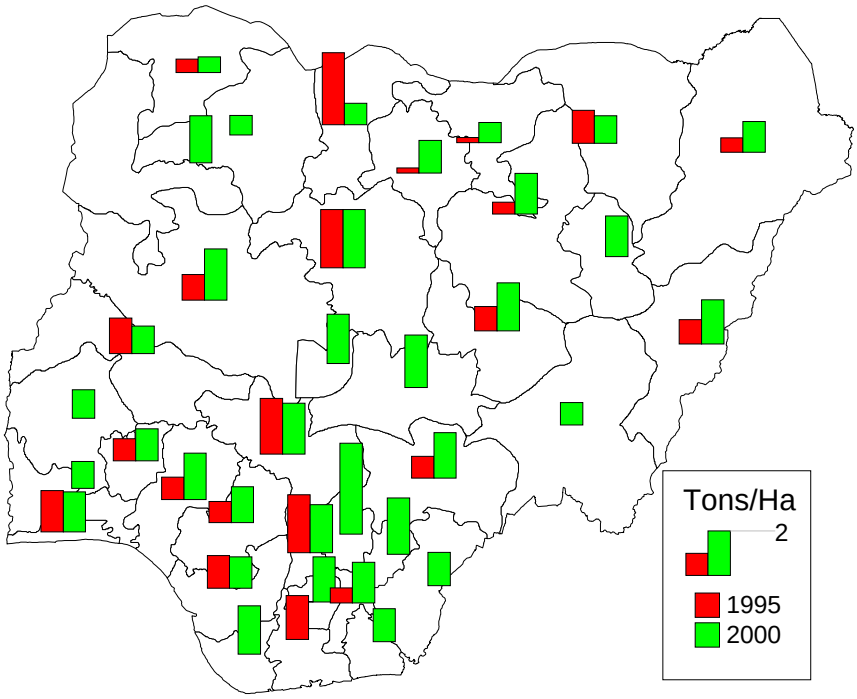


Figure 7 : Rice yield variation across states between 1995 and 2000



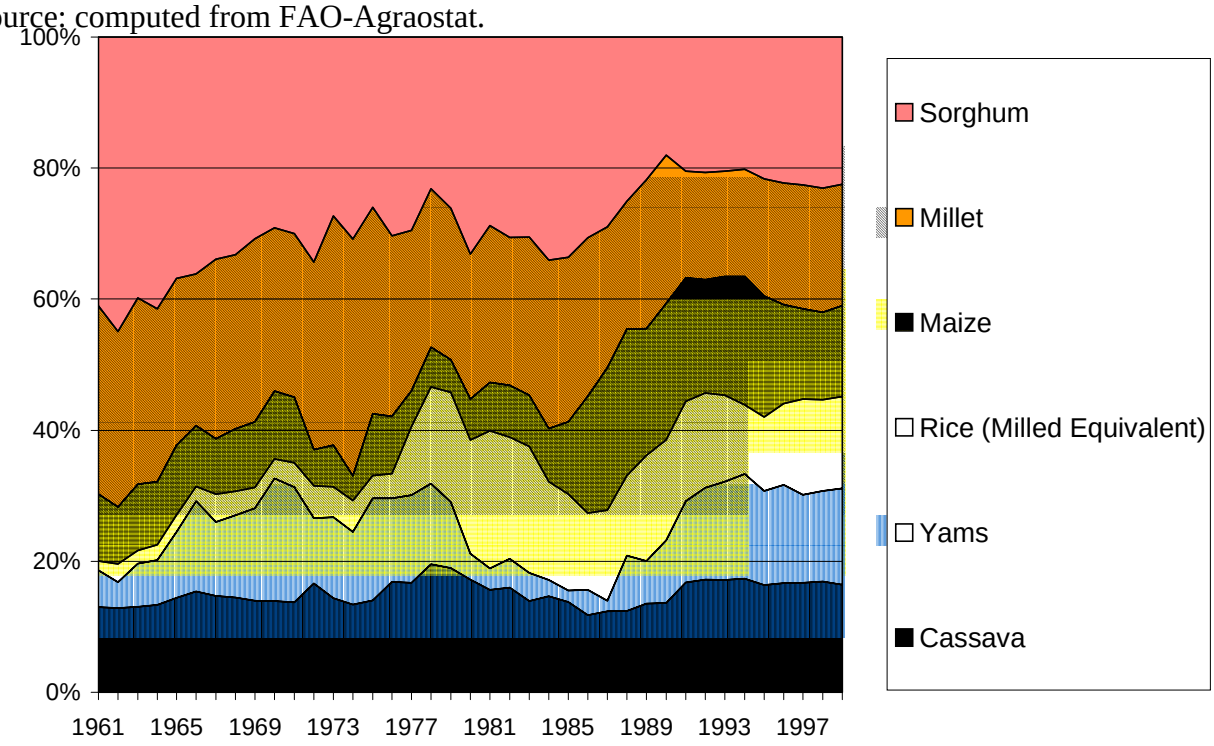
Source: PCU,2000 and NAERLS, 1995

2.2 Rice Demand

The demand for rice in Nigeria has been soaring at a very fast rate over the years. A combination of various factors seems to have triggered the increase in rice consumption. According to Akanji (1995), rising demand was partly the result of increasing population growth. Also, increased income levels following the discovery of crude oil led to a rise in the demand for the commodity. The most important factor contributing to the shift in consumer preferences away from traditional staples and toward rice is rapid urbanization and associated changes in family occupational structures. As women enter the work force, the opportunity cost of their time increases and convenience foods such as rice, which can be prepared quickly, rise in importance. Similarly, as men work at greater distances from their homes in the urban setting, more meals are consumed from the market where the ease of rice preparation has given it a distinct advantage. These trends have meant that rice is no longer a luxury food but has become a major source of calories for the urban poor. The average Nigerian now consumes 24.8 kg of rice per year, representing 9% of total caloric intake (RiceWeb, 2001). Figure 8 shows the evolution of the share of the main staples in Nigerian average food consumption in calories terms over time – and highlights the increasing importance of rice.

Figure 8: Evolution of the share of the main staples in Nigerian average food consumption in calories terms.

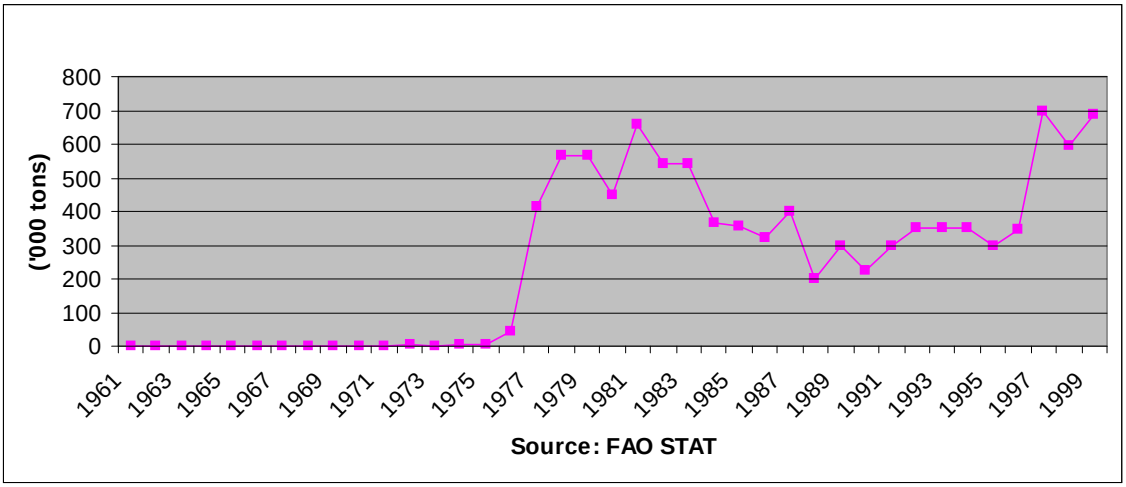
Source: computed from FAO-Agraostat.



2.3 Rice imports

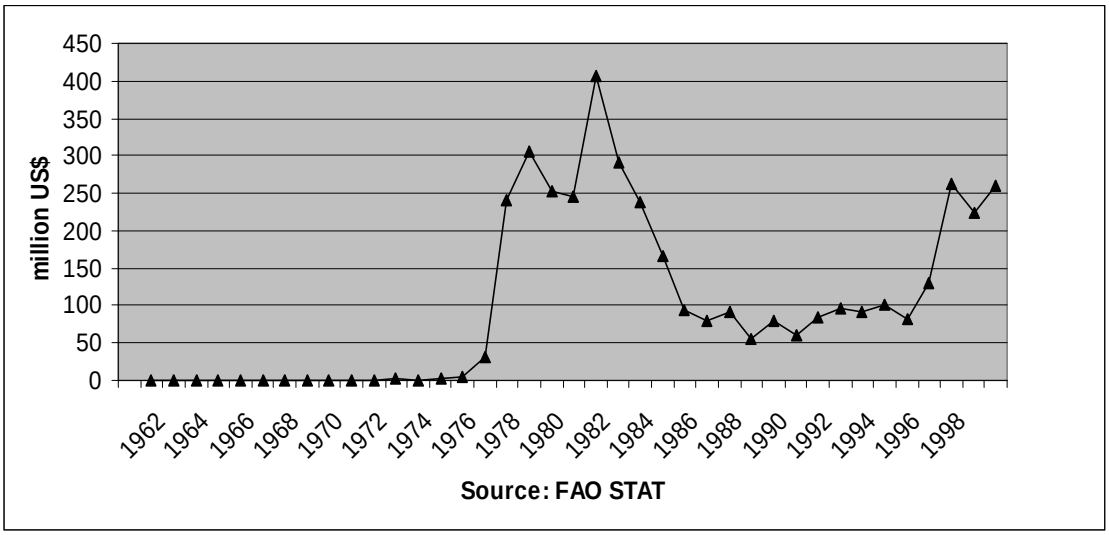
Though rice contributes a significant proportion of the food requirements of the population, production capacity is far below the national requirements for rice (Wudiri and Fatoba, 1992; and Ladebo, 1999). In order to meet the increasing demand for rice, Nigeria has had to resort to importation of milled rice to bridge the gap between domestic demand and supply. Figure 9 gives an indication of rice importation by Nigeria. The figure reveals rice import was very insignificant in the 1960s and early 1970s. However, there was a phenomenal rise in imports in 1977 as the quantity of rice imported in this year alone (45 thousand tons) was more than the combined quantity of rice imported during the 1961-1975 period. Another major phenomenal rise was experienced in 1977 when import rose to 413 thousand tons. Rice imports did not begin to decline until 1981 as a result of some policy measures put in place to check the importation of the commodity. Even then, the quantity imported on an annual basis was over 300 thousand tons. Imports dropped significantly from 1985 when the ban was placed on rice. Although, rice imports began to rise again in 1991, major importation did not begin until after the lifting of the ban in 1995.

Figure 9: Quantity of Nigeria's Rice Imports



Nigeria's rice import is paid for in foreign currency. Given the precarious balance of payment position of the country especially in the late 1980s, rice import became a major source of concern. Figure 10 shows that whereas Nigeria spent about $0.1 million on rice importation in 1970, by 1999, the value of import was $259 million. This implies that between 1961 and 1999, Nigeria had spent $4 billion on rice importation alone, an average annual import value of $102 million. This raises a number of questions. Why spent such a he some of limited foreign exchange on rice imports when the country has the capacity to be self-sufficient in rice? Why has government policy on rice importation been highly inconsistent? Is government responding to some external and/or domestic pressure? Does the government not have confidence in the ability of the local producers to respond to the challenges of increased demand for rice? Or have they been so slow in responding?

Figure 10: Value of Nigeria's Rice Import



3 Characteristics of Nigeria's Rice Production Systems

Nigeria encompasses four major agro-ecological zones, with rainfall diminishing along a South-North gradient (Adedipe et al., 1996). The forest zone borders the coast in the South, and going Northward gives way to the Guinea and Sudan Savannah. Nigeria's North Eastern fringe falls within the Sahel zone.

Rice can be grown over a wide range of edaphic and ecological conditions. In order to formulate a national strategy and action plan for increasing rice production, due cognizance must be made of these widely varying conditions. The prevalent types of rice production systems in Nigeria include rainfed upland, rainfed lowland and irrigated lowland. Other less common rice production systems include deep water and mangrove rice (Singh et al., 1997). Rice farmers tend to be small-scale, with farms of 1-2 ha.

3.1 Rice-Based Systems

3.1.1 Rainfed Upland Rice Production Systems

Upland rice cultivation is an important rice production system in Nigeria. This system accounts for 30% of the total area under rice. Under this system, rice is directly seeded in non-flooded, well drained soil on level to steeply sloping fields. Rainfall is the only source of water – generally limiting this system to areas with more than 1,300 mm of annual rainfall. Because of better rainfall, yields are slightly higher in the south than in the north. The average yield of the rainfed upland rice is 1.7 tons/ha (see Table 2).

Table 2 shows that the rainfed upland rice system is predominant in the southern part of the Nigeria – but can also be found in the north. The bulk of rice cultivation in Ogun, Ondo, Oyo, Edo and Delta states falls within this category.

Upland rice is typically intercropped with various other crops, including vegetables, maize, yam or cassava. The land is cleared between December and March. With the onset of the rains in early April, the land is prepared and the seeds broadcast and harrowed in with a hoe. Ofada is the traditional variety cultivated. Hand-weeding is the usual practice and harvesting is manual.

Under the traditional rainfed upland system of rice production, soil fertility is maintained by the bush fallow method. A major problem of the system is that the slash-and-burn agricultural practice that often follows logging in upland areas opens the way for serious soil degradation that impacts the land resource in the entire watershed. Also, in the south west, upland rice frequently suffers from the mid-season drought which leads to extra susceptibility to rice blast. Soil nutrient disorders, insects, weeds, rodents and birds present considerable problems. Normally, only two years continuous cropping under rice is possible on the highly leached soils found in these areas.

Since 1974 when the National Accelerated Food Production Program (NAFPP) was launched, the improved upland rice cultivation system became a common feature in Nigeria, particularly for cooperative farmers in southern Nigeria. Under the improved

upland rice production systems, cultural practices are the same as in traditional upland rice system except that improved seeds and fertilizers are used. Annex 2 provides the major rice varieties cultivated in Nigeria – including upland varieties.

3.1.2 Rainfed Lowland Rice Production Systems

Rainfed lowland rice is the most important system in Nigeria and accounts for approximately half of total rice area in Nigeria. Increasing use of rainfed lowlands appears to have been a major source of the rapid increase in paddy production in recent years (FAO, 2001).

Rice under this system is transplanted or seeded directly in the soil on level to slightly sloping fields with variable depth and duration of flooding depending on rainfall. This system is found mainly along the flooded river valleys such as the Niger Basin, Kaduna Basin, Benue Basin, etc. of the Northern states. But such systems is also common in Abakaliki and Ogoja areas of Ebonyi and Cross River states respectively. In most of these areas, the river banks or Fadamas[3] are usually flooded during the rainy season which last for 4-5 months. Only one crop is planted in a year, and there is no water control.

The average yield of 2.2 tons/ha is relatively higher than rainfed upland rice but typically lower than that of the irrigated system. Beside the traditional system of rainfed lowland rice, new methods have been introduced employing fertilizers and improved seeds. Rainfed lowland rice is typically grown as a sole crop. Annex 2 mentions the major varieties cultivated in this ecology.

3.1.3 Irrigated Rice Production Systems

Irrigated rice systems account for 16% of total rice area in Nigeria (FAO data). Irrigated rice encompasses lowlands with good water control, enabling two crops per year. The yield obtained (3.5 tons/ha) is generally higher than in other systems. Irrigated rice systems include both large-scale irrigation schemes in the north and small-scale developed inland valley bottoms in the south. Rice is the main irrigated crop in Nigeria – particularly in the main season (Fagade, 1997;Shaib et al., 1997).

This system of rice cultivation became important during the late 1970s and 1980s with substantial government investment. In 1979 for instance, the following major rice schemes were identified (WARDA, 1981):

- South Chad Irrigation Scheme with a capacity of 8,000 hectares;
- Sokoto-Rima Basin Irrigation Scheme with a capacity of 4,000 hectares;
- Bageddi Irrigation Scheme with a capacity of 580 hectares;
- Edozhigi Irrigation Scheme with a capacity of 900 hectares;
- Shonga Irrigation Scheme with a capacity of 300 hectares; and
- Loguma Irrigation Scheme with a capacity of 200 hectares.

Some of these large-scale irrigation schemes have totally collapsed mainly due to lack of proper maintenance while others are functioning far below full capacity. In part this is related to the retrenchment of the public sector in relation to structural adjustment

[3] Fadamas are lowlands that have features of both flood plains and inland valleys. They tend to be wider than 200 m – the maximum width for a lowland to be considered as an inland valley, yet have more hydrological similarities with an inland valley than a floodplain.

programs. These experiences have also led to an increased emphasis on small-scale irrigation schemes.

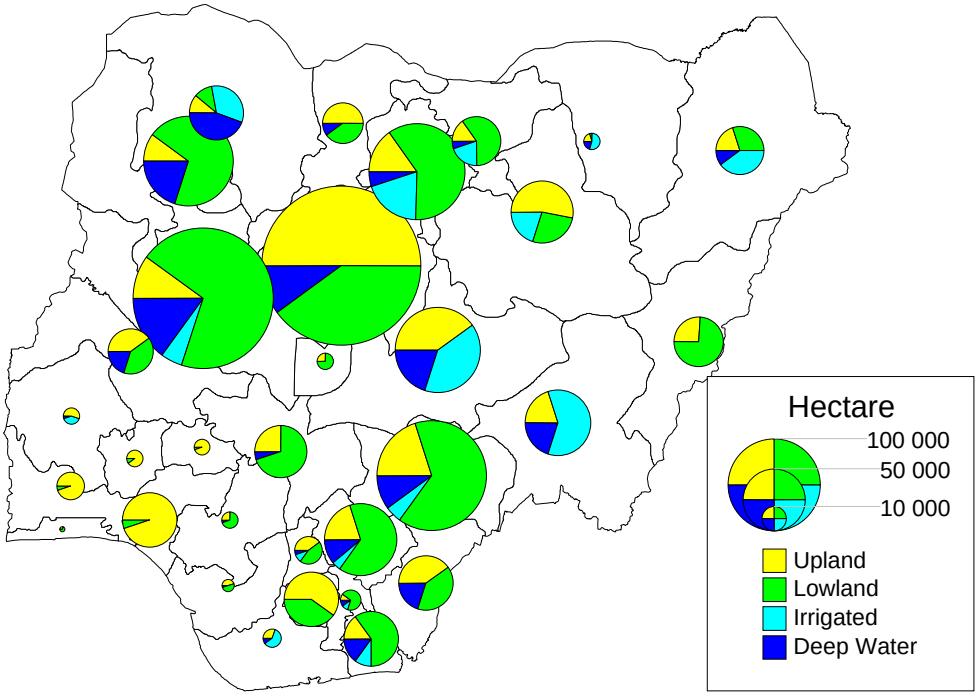
Fertilizer applications and use of some chemicals is common and occasionally, mechanisation is used particularly in land preparation. Major rice varieties cultivated in this ecology can be found in Annex 2.

3.1.4 Deepwater/Floating & Mangrove Rice Production Systems

Deepwater rice system can generally be defined as those where flooding achieves a depth of 60-100 cm, and floating rice system as those where flooding exceeds 100 cm. Deepwater and floating rice represents an increasingly marginalized production system for which area and production figures are generally limited and unreliable. In Nigeria, this production system can be found in the Sokoto-Rima valleys and in some other flooded plains or Fadamas where water depth is very high; and the water level may rise quickly.

Under this system, the rice cultivated is basically *Oryza glaberrima* and quite often the seed is self propagated. In Birnin-Kebbi area and around the flooded areas of the Rima valley, the floating rice farmers use *O. sativa* varieties as Mali-Org (FARO 7) and ICC.B (FARO 6) which have higher yields.

Figure 11 Geographical distribution of rice area by ecology in Nigeria



The mangrove swamp rice production system is found where the ocean's tidal action causes inundation at high tide and drainage at low tide. Most mangrove swamps experience a salt-free growing period during the rainy season when freshwater floods wash the land and displace tidal flows. As a result, the rice growing period is directly related to distance from the ocean, varying between less than four months in the

nearest estuaries to more than six months in those more distant. Soils are generally more fertile than in other ecologies since they benefit from regular deposits of silt during annual flooding. However, the soils are also characterised by high salinity and sulfate acidity. Specific areas where this production system can be found include the Niger Delta – particularly in the deep flooded areas of Ilushi, Lagos and Calabar. While this system holds a great potential for rice cultivation in Nigeria, high labour costs associated with clearing and potential negative environmental impacts arising from oil exploration activities pose major constraints to further area expansion.

Table 2: Major Features of Nigerian Rice Production Systems

Production System	Major States Covered	Estimated share of national rice area	Average Yield (ton/ha)
Rainfed Upland	Ogun, Ondo, Osun, Ekiti, Oyo, Edo, Delta, Niger, Kwara, Kogi, Sokoto, Kebbi, Kaduna and Benue states	30%	1.7
Rainfed Lowland	Ondo, Ekiti, Delta, Edo, Rivers, Bayelsa, Cross River, Akwa Ibom, Lagos, all major river valleys, e.g., shallow swamps of Niger basin, Kaduna basin and inland swamps of Abakaliki and Ogoja areas	47%	2.2
Irrigated	Niger, Sokoto, Kebbi, Borno, Benue, Kogi, Anambra, Enugu, Ebonyi and Cross River states	16%	3.5
Deep water / Floating	Flooded areas of Rima valley-Kebbi state and deep flood areas of Ilushi, Delta state	5%	1.3
Mangrove Swamp	Ondo, Ekiti, Delta, Edo, Rivers, Bayelsa, Cross River, Akwa Ibom Lagos	1%	2.0

3.2 Profitability of Rice Production in Nigeria

Profitability is a major economic consideration in the cultivation of rice in Nigeria. Accordingly, several attempts have been made to estimate the costs and returns from the cultivation of the commodity. Various studies will be reviewed subsequently – first across rice-based systems and subsequently across crops.

3.2.1 Profitability across rice-based systems

Olagoke (1990) compared the average production costs, input usage and returns for the major rice production systems in the Uzo-Uwani area of Enugu state, a major rice producing state in SE Nigeria. The study found that the highest rice yield per hectare was obtained from irrigated fields which averaged 2.19 tons paddy per ha. This was followed by the swamp fields with a mean paddy yield of 1.96 tons/ha while the upland field gave 1.71 tons/ha (Table 3). Irrigated rice fields also averaged the highest total production costs, largely due to the cost of irrigation water and higher labour and machine use costs. As a result of the higher production costs of irrigated rice, swamp rice with slightly lower yields, achieved the highest net returns of the three production systems. Swamp rice also achieved the lowest production costs per kg of output – N 0.92/kg which compares with a unit paddy price of N 1.21 per kg.

Total production costs and yields were the lowest for upland rice, resulting in the lowest average returns per hectare. However, production costs per kg of output for upland rice were still slightly lower than that for irrigated rice. Upland rice fields were provided with less fertilizer per hectare and less labour, the latter due primarily to fewer packaging requirements for the lower yield and the lack of plant nurseries in upland rice farming. Farmers used more seed, and more expensive seed, on upland rice fields.

Weeding costs comprised the largest share of average total labour costs on upland and irrigated rice fields, accounting for about 35% and 28% of total labour costs respectively (see Table 3). Average weeding costs for the swamp rice fields accounted for about 23% of total labour costs and were second only to land preparation costs (24%). These results indicate the importance of weed control in rice cultivation. Land preparation and flooding of rice plots in the irrigated and swamp systems can assist to control weed growth relative to the upland system, which explains in part the higher weeding requirement observed in the upland system.

Table 3: Costs and returns per ha in various rice production systems in Uzo-Uwani, Enugu State, South East Nigeria (1987-88)

Item		Irrigated	Swamp	Upland
Rice Output (RO)	Ton/ha			
	N/ha	2,653	2,371	1,970
Capital Operating Inputs	Rice seed	105	103	122
	Fertilizer	73	81	62
	Machine-hire cost	308	185	212
	Irrigation cost	197		
	Other capital operating costs	101	96	71
	Total capital operating costs (TCOC)	784	466	468
Labour	Land preparation	244	298	210
	Nursery	80	61	
	Planting	224	163	133
	Weeding	382	285	413
	Birdscaring	65	51	45
	Harvesting	257	251	285
	Threshing/winnowing	11	78	43
	Packaging	43	32	24
	Others	75	31	17
	Total labour input (TLI)	1,381	1,251	1,171
Total variable costs (TVC=TCOC+TLI)		2,165	1,717	1,640
Gross margin	(RO-TVC)	488	654	330
Fixed Costs	Depreciation	49	523	45
	Land charge	26	33	36
	Total fixed cost (TFC)	75	86	81
Total costs	(TC=TVC+TFC)	2,240	1,803	1,721
Net return	(RO-TC)	413	568	249
Production cost per kg (N/kg)		1.02	0.92	1.01

Source: Olagoke, 1991

Okorji and Onwuka (1994) estimated the profitability of rice production at Uzo-Uwani area of Enugu state employing data more recent than the previous study. Their comparison was between irrigated and non-irrigated rice production systems. Table 4 shows that the total variable cost per hectare was N4,385 for non-irrigated rice and N4,688 for irrigated rice. On the other hand, the total fixed cost per hectare was N465 for non-irrigated rice and N1,554 for irrigated rice. This wide variation between the fixed costs for the two systems is due to high land and water charges under irrigated system.

Labour, the most expensive resource in rice production constituted about 55% and 50% of the total costs of production in non-irrigated and irrigated systems respectively. The relatively low labour costs in the area could be attributed to availability of tractor hire service and hence mechanisation of land preparation for rice cultivation as well as application of herbicides both of which reduced labour input for tillage and weeding respectively. The low disparity between the labour costs of the two systems is mainly due to the fact that the same wage rate was paid for the same farm operations in the two systems; labour inputs by operation were similar too.

Wage rates, however, varied by farm operation depending mainly on the nature of the operations. For instance, higher wage rates were paid for such delicate and tedious farm operation as nursery preparations

The net return per hectare for non-irrigated and irrigated rice farmers were N4,615 and N5,197 respectively. The higher return obtained from the irrigated rice system was as a result of the higher paddy yields obtained under the irrigated conditions.

Table 4 indicates that the cost of production per kilogram under non-irrigated was N1.7 and N1.8 under irrigated rice system. Although yield of rice was comparatively higher under irrigated system, the total cost of production was also relatively high. Fixed costs, for instance, accounted for as much as 25% under irrigated but only 10% under non-irrigated system. The lower unit cost of production under the non-irrigated than the irrigated system was as a result of the relatively high yield and low production cost.

Table 4 indicates that an average of 2,842kg of paddy rice per hectare was harvested from non-irrigated system while 3,435kg of paddy rice per hectare was harvested from the irrigated system. At the average prevailing market price of N3 per kilogram of paddy rice, the value of production per hectare was N9,465 for non-irrigated rice system and N11,439 for irrigated rice system.

Nwoye (1997) investigated the economics of rice production by small-holder farmers in Anambra state, SE Nigeria focusing specifically on swamp rice which is the dominant system in the area. Rice production was observed to be more revenue yielding than other relative crops. Swamp rice yielded 2.0 ton paddy per ha, resulting in gross margin of N3,737 per ha and a total production cost of N 2.67 per kg. For every N1 spent, the farmer made N1.59 in revenue.

Table 4: Costs and Returns in Non-irrigated and Irrigated Rice Production Systems in Uzo-Uwani, Enugu State, SE Nigeria (1990)

Item	Unit	Non-Irrigated System			Irrigated System		
		Quantity	Price	Value (N)	Quantity	Price	Value (N)
Output	Kg	2,842	3	9,465	3,435	3	11,438
Operating Inputs							
- Rice seed	Kg	73	4	291	75	4	295
- Fertilizer	Kg	322	1	290	347	1	312
- Insecticide	Litres	2	73	150	2	78	147
- Herbicide	Litres	6	66	413	6	67	396
Labour:							
- Nursery preparation	Mandays	2	25	53	2	26	52
- Slashing and land preparation	"	32	20	637	31	23	726
- Transplanting/Sowing	"	18	18	336	18	21	375
- Fertilizer & chemical application	"	4	34	137	4	37	149
- Weeding	"	19	19	363	21	21	430
- Birdscaring	"	35	5	186	35	5	171
- Harvesting	"	16	19	298	16	18	294
- Gathering	"	4	36	145	4	41	162
- Threshing (mechanical)	"	1	-	717	-	-	758
- Winnowing/bagging	"	4	20	76	5	21	95
Total labour	"	138		2,950	143		3,212
Opportunity cost of variable							
Cost at 18% for 5 months	N			292			327
Sub total	N			4,385			4,688
Fixed Costs							
Land charge	N			200			1,211
Depreciation	N			232			234.
Opportunity cost of fixed cost at 18% for 5 months	N	1ha	200	32	1	1,211	108
Sub total	N			465			1,554
Total cost	N			4850			6,241
Net return	N			4615			5,197
Output per manday				21			24
Value of output per manday (N)				68			80
Cost of production per kg (N)				1.70			1.82

Source: Okorji and Onwuka (1994)

Table 5 Gross Margin Analysis of Swamp Rice Production by Small-Holder Farmers in Anambra State, SE Nigeria

	Item	Unit	Quantity	Price/Unit (N)	Total Value (N)
Total Revenue	Produce	kg	1,977	4.30	8,500
Variable Costs	Rice seed	kg	50	20	1000
	Fertilizer	kg	50	36	1800
	Bags	No.	9	30	270
	Twine	Roll	1.5	5.00	75
Labour	Slashing & land prep.	MD	43	9.99	430
	Planting	MD	22	8.32	183
	Fertilizer Application	MD	13	8.31	108
	Weeding	MD	26	10.02	261
	Bird Scaring	MD	32	8.34	267
	Harvesting	MD	19	9.98	190
	Threshing, winnowing and bagging	MD	18	10.00	180
Total Labour Cost					1,618
Total Variable Cost (TVC)					4,763
Gross Margin (TR – TVC)					3,737
Provision for depreciation of fixed assets excl. land					578
Total Cost (TVC + Depreciation)					5,341
Total production cost per kg (N/kg)					2.67

Source: (Nwoye, 1997)

Fabusoro (2000) studied upland rice cropping systems in Ogun state, SW Nigeria. Sole cropping of rice is the prevalent practice (82% of respondents), with the remainder intercropping with melon, cassava and maize. The study also estimates the short run profitability of these four rice based cropping systems, namely rice only and rice/melon, rice/cassava and rice/maize (Table 6). The table shows that the rice/melon combination compares favorably with the other systems. However, care should be taken interpreting the rice/melon system as this is based on only 4 cases and these farmers obtain substantially higher rice yields. The other two intercropping systems also outperformed the monocropping practice. Table 6 also highlights that labour accounts for the greatest cost across systems.

3.2.2 Profitability across crops

Attempts have also been made in the literature to compare the profitability of upland and lowland rice production with other food commodities. This comparison is very crucial in the light of the fact that farmers are primarily motivated by profitability considerations and therefore are likely to shift resources from rice to other commodities if it is found that rice is relatively less profitable.

Table 7 gives indication of the profitability of rice production vis-à-vis other food commodities in the central zone. The table reveals that though the cost of production under lowland rice cultivation is relatively higher than that of upland rice cultivation, lowland rice cultivation is relatively more profitable than upland rice. From the table, it could be seen that the net returns from lowland rice cultivation is twice that from

upland rice. This emanates chiefly from the relatively higher yield from lowland rice cultivation. When compared with other major commodities cultivated in the central zone of Nigeria, the table shows that lowland rice cultivation is the third most profitable crop enterprise (see column no 9). Also, the table indicates that returns per naira invested in lowland rice cultivation is very high. It ranks third on the list of crops (see column no 10).

Table 6: Crop budget indicators for upland rice cropping systems (hectare basis) in Ogun State, SW Nigeria 1999

	Rice Only		Rice/Melon		Rice/Cassava		Rice/Maize	
	Value	% share	Value	% share	Value	% share	Value	% share
Rice yield (t/ha)	1.25		3.40		2.87		1.04	
Revenue (N/ha)	43,302		86,796		80,120		51,324	
- Rice	43,302	100	69,442	80	58,010	72	31,980	62
- Intercrop			17,354	20	22,110	28	19,344	38
Variable cost (N/ha)								
- Fertilizer	605	3	-	-	459	1	113	1
- Agrochemicals	76	0	-	-	289	1	-	-
- Planting materials	1,595	9	1,170	7	2,879	9	1,297	10
- Family labour	8,156	45	2,355	15	13,416	41	5,814	46
- Hired labour	6,150	34	10,618	66	13,376	41	4,529	36
- Land	1,426	8	1,855	12	2,362	7	866	6
Total Variable Cost	17,990	100	15,998	100	32,782	100	12,618	100
Gross margin (N/ha)	25,312		70,798		47,339		38,706	
Number of cases (n)	133		4		17		8	

Source: (Fabusoro, 2000)

Table 8 provides a comparison of yield, cultivation cost and benefit of various irrigated crops in Kano State during 1992/93 dry season. Across the crops considered, rice appears to be an attractive option there – in part as a result of the high paddy yield.

Akande (1994) assesses the comparative advantage of different regions across Nigeria for producing various food grains – in particular rice, maize, sorghum, millet and cowpea. The study also distinguishes between various crop production technologies, mixed and sole cropping and for rice distinguishes between upland, rainfed lowland and irrigated. The study highlights that the comparative advantage of the different agro-ecological zones varies over crops. Only a few production technologies were found to be economically competitive. Rice production did not have a pronounced economic competitiveness in any of the agro-ecological zones considered (forest, Guinea and Sudan savannah). It should be noted though that at the time of the study rice production was protected by the import ban.

Table 7: Profitability of Major Crops Grown as Sole Crops in Central Zone of Nigeria (1996)

Crops	Input:Variable Cost (N)						Output: Returns			
	1 Seeds	2 Ferti-lizer	3 Chemi-cals	4 Labour	5 Total Variable Cost (N)	6 Yield (tons /ha)	7 Price (N/ton)	8 Gross return (N) (6x7)	9 Gross Margin/ha (8-5) (N)	10 Return/N invested (9/5) (N)
CEREALS										
1. Rice (Upland)	800	1575	5000	7500	14,875	1.5	12000	18000	3125	0.21
2. Rice (Lowland)	500	2000	5000	8900	16,400	2.0	12000	24000	7600	0.46
3. Maize	500	1200	500	7700	9,900	1.5	8000	12000	2100	0.21
4. Sorghum	200	600		2700	3,500	0.7	6000	4200	700	0.20
LEGUMES										
5. Soyabean	400	600	1000	6800	8,800	1.0	12000	12000	3200	0.26
Cowpea	450	750	2000	8100	11,300	0.6	30000	18000	6700	0.60
7. Groundnut	1500	600	100	7100	9,300	0.9	13000	11700	2400	0.26
ROOTS & TUBERS										
8. Cassava	750	600		11800	13,150	16	1000	22000	8850	0.67
9. Yam	30000	600		32000	63,400	12.0	6000	72000	8600	0.14

Source: Adedipe et al. 1996. Prices based on Mid-1994 costs and prices. 1994 Exchange rate N52.28/US$

Table 8 Yield, cultivation cost and benefit of irrigated crops in Kano State, NW Nigeria, during 1992/93 dry season.

Crop	Yield/ha	1993 Market price (N)	Total Income (N/ha)	Cost of Production (N/ha)	Benefit (N/ha)
Wheat	2, 500kg	700/100kg	17 500	9 535	7 765
Rice (Paddy)	6 000	600/100kg	36 000	14 860	21 140
Maize (Green cobs)	60,000 cobs	0.4/cob	24 000	12 560	11 440
Tomato	200 baskets	120/basket	24 000	15 180	8 820
Onion	150 bags	150bag	22 500	14 780	7 720
Sugarcane	50 tons	1,000/ton	50 000	23 660	26 340
Pepper	200 baskets	120/basket	24 000	13 580	10 420
Garlic	25 baskets	1800/basket	45 000	18 830	26 170

Source: KNARDA Technical Handbook for Fadama Programme as cited in (Adedipe et al., 1996).

3.2.3 Technology adoption and profitability

Other studies have emphasized particular technologies – for instance in terms of adoption and economic returns to adoption. NAERLS (as cited by Omotayo et al 2001) have assessed the adoption of technologies on selected food crops in some ADPs across the country. Table 9 indicates that among the various technologies extended to the various crops in the study areas, technology adoption is lowest for rice. The table indicates that less than 20% adoption rate was recorded on improved varieties of rice, 7% for pesticides, 24% for fertilizer use and 16% for storage. Some of the reasons advanced for the low adoption of some of the technologies include unavailability and high cost of these technologies.

Table 9: Technology Adoption Rates for Major Food Crops in selected ADPs, Nigeria, 1997

States	Crops	Technology Adoption Rate (%)			
		Improved varieties	Pesticides	Fertilizer use	Storage
Sokoto, Kano, Borno, Bauchi	Sorghum	28.2	16.8	52.8	34.8
Sokoto, Borno	Millet	36.5	16.0	70.0	66.0
Ogun, Edo, Enugu, Cross River	Cassava	68.5	4.5	33.0	7.0
Kano, Bauchi, Ogun, Edo, Cross River, Niger, Plateau	Maize	46.6	10.9	35.9	20.7
Niger, Plateau	Rice	18.5	7.0	24.0	16.0
Benue, Plateau, Niger, Kogi, Kwara, Abuja	Yam			56.1	

Source: NAERLS, 1997 as cited in Omotayo et al., 2001

The use of mechanization of field operations with tractors in Nigerian agriculture is limited. Okereke (1991) compared the economics of rice production from traditional farms employing only manual labour and that from farms using tractors (Table 10). His findings reveal that using tractors is profitable under some circumstances and confirm that tractor use can ensure timely preparation of land to take advantage of the early rains. However, tractors were not readily available, in spite of the existence of private and government tractor hire services. The government tractors were frequently in need of repair. Furthermore, Akande (1994) highlighted that mechanization in the early 1990s was socially costly and not in the nation's interest.

Table 10 Economics of tractor use in rice production in Anambra State, SE Nigeria

	Tractor users (N/ha)	Non-tractor users (N/ha)
Gross return	6,231	4,616
Total cost	3,060	3,465
Net return	3,171	1,151

Source: Okereke, 1991

3.2.4 Discussion

Nigeria is a vast country with a variety of agroecological zones and rice production systems. The foregoing discussion has highlighted that numerous studies in relation to Nigerian rice production systems already exist. Still, most studies provide only an assessment for a particular site at a particular time – whereas systems are diverse and dynamic. Consequently, it becomes difficult to obtain a comprehensive overview – both in terms of time and space.

The widespread cultivation of rice throughout Nigeria suggests that its cultivation is an attractive option for numerous farmers. The various assessments of profitability of

rice in the literature indeed indicate that rice cultivation in Nigeria was and is profitable.

Irrigated rice production systems typically obtain the highest yield across the rice production systems. Private returns to irrigated rice also appear to be favourable. However, these typically do not account for the actual investment cost made by the public sector. With the retrenchment of the public sector, the scale of irrigation schemes has diminished substantially whereas water users are to increasingly cover investment and maintenance costs themselves. It remains to be seen whether irrigation in the new set-up remains privately profitable. For rainfed systems, rainfed lowland rice appears to have more favourable returns than upland rice. In addition, lowland rice cultivation also appears to be attractive vis-à-vis some other major food crops such as maize, sorghum, soyabean, yam and groundnut.

4 Rice Processing and Marketing

The purpose of this section is to describe and analyse the prevalent rice processing systems in Nigeria. The analysis in this section has been highly limited by the paucity of data. This stresses the urgent need for a comprehensive study of rice processing in Nigeria before appropriate policy action plan can be advanced on the relative efficiency or comparative advantage of each identified system.

4.1 Rice Processing

4.1.1 Processing technologies

Parboiling

The usual practice is to parboil the paddy before delivery to the mills for milling. Where there is a mill nearby, farmers may parboil their own rice, then transport it to the mill for milling. The milled parboiled rice is then sold by the farmer in the local market or returned home for consumption. If bought as paddy, the parboiling is done by the trader's family or given on contract.

Parboiling is often done using local drums. The reason advanced for this practice is that given that most paddies are a mixture of various varieties which require different heating temperature, employing local drums which permit the monitoring of the temperature is the most efficient means of parboiling such paddies consisting of various varieties.

The traditional domestic parboiling techniques have been studied by Stuykers (1982). Essentially, the traditional technique is to soak the paddy in cold water for two days, and then heat until the grains show signs of splitting, whereupon the rice is removed for drying. The problem lies in the long soaking when fermentation commences, and also with the very drying (in 2 hours or less) which leads to increased broken grains on milling. A reduction from 49% broken grains with the traditional system of drying, to 25% broken grains with slower drying was reported by the Tropical Product Institute study.

There is the complete absence of modern technology for the drying of parboiled paddy. Often, drying is done by the road side under the sun. This accounts for the presence of foreign bodies such as stones in the final product. Sun drying in the open does not allow for drying during the rainy seasons. Again, this accounts for the low level of milling during such periods. Where it is possible to dry during the rainy season, often the paddies do not dry properly and this partly accounts for the foul odour of the final product.

The parboiling costs of the domestic parboiler, compared with the trader, are not likely to be much lower, as the equipment and actual work-time is not likely to deviate much from those of the trader. However, the out-turn increases from 65% to 69% broken grains reduced from 45-25% to 5% and off odour and foreign matter eliminated. There is little or no difference in the value added due to reduced processing costs. The difference lies in the increase in out turn and the value of the

premium for the grade 1 rice, with a price difference of over 30% above the unimproved processing methods.

Ojehomon et al (1998) provides a comparison of rice parboiling technologies in Niger State.

Milling

Three systems of rice processing can be identified in Nigeria. These are the Traditional or Hand-pounding System, the Small Mill Processing System and the Large Mill Processing System.

The Hand-pounding system is a traditional system of processing rice paddy still used by some village rice farmers in Nigeria. This system involves soaking of paddy for about 24 hours. After, the paddy is boiled in water for about 20 minutes. The boiled paddy is then spread in the sun (usually by the road side) to dry. After drying, the paddy is pounded in a mortar to separate husks and bran from the grains. The last stage of this processing is the winnowing.

A major feature of the traditional system is that it is very slow and labour intensive. Furthermore, the final product obtained often contains a high percentage of broken grains and foreign bodies. Given these limitations, this system is fast being discarded with.

The small rice mills are the most predominant of the three processing systems. They can be found in major rice processing areas such as Abakaliki in Ebonyi state, Lafia in Nasarawa state and a host of others. Personal discussions with rice experts reveal that about 85 percent of Nigerian rice is processed through the small milling system. This system of processing involves the use of mechanised milling units (often operating the old cono disc technology) with a maximum and minimum capacity of 600 and 200-300 tons per day respectively. The use of the rubber roller technology (a modernized technology) is not common among the rice millers. This, according to the millers, is the result of non-patronization of rubber roller milled rice by consumers. Consumers prefer the cono disc milled rice because of its attractiveness compared with the rubber roller milled rice. While some of the machines are diesel powered, others are electrically energised. The use of diesel powered engines is not unconnected with the epileptic power supply in the country.

At the moment, most small rice mills operate at about 1 ton/hr. This is due to the lack of availability of sufficient paddy for processing. Some of the millers go far away to look for paddy to buy and sometimes they even go beyond the shores of the country in search of paddy.

The final product of the small mills is generally superior to that processed under the traditional hand-pounding system. In some cases however, the final product contains a high percentage of broken grains and thus fetches a lower price in the market. The small milling units perform both hulling and milling operations. Usually, milling is done for a fee. In July 2001, the milling fee was N2000/ton at Lafia in Nasarawa state.

A major problem with processing is the non-availability of destoning machine. Although some major rice processing areas have destoners, this is not commonly the case. For instance, Lafia which is the largest rice processing area in Nigeria cannot boast of a single destoner. Abakaliki which is the second largest has only two destoners serving over 700 millers. The lack of destoners coupled with the drying of parboiled paddy by the road side accounts for the large presence of stones in the final product. Where destoners are employed, there is usually less than 3 percent stones in the final product.

In Nigeria, few large mills exist and most of these mills are owned by government or quasi-government parastatals such as the State Agricultural Development Projects. The Pateggi, Uzo-Awani, and the Agbede rice mills are typical examples of large mills in Nigeria. These mills combine rice milling with rice polishing, and in most cases, they possess separate parboiling equipment. Large mills are not popular with the Nigerian farmers. It is also important to note that for large mills the amount of capital investment required is substantial and most of the existing large mills have broken down as a result of lack of spare parts and the general poor maintenance culture of government owned assets.

Existing mills are of the steel drum type (Engleburg and Lewis Grant). All studies report a high proportion of broken grains: 36% in Kwara State (Oni and Olayemi, 1973), 25% in Anambra-Imo (Spenser, 1979), 49% in Bida (Clark, 1982). No polisher or cleaners are used. Other problems are poor state of repair of hullers, poor operational control (operators' expertise in keeping the engine going), poor parboiling and drying techniques. The resulting rice is thus generally dirty, having minerals and vegetable contamination (2% and 0.2% respectively) and often having a strong off-odour due to slight fermentation during the parboiling process.

4.1.2 Profitability of Rice Processing

There are a few studies on the profitability of rice processing in Nigeria. These studies are however restrictive in the sense that they do not compare the profitability of rice processing in the various regions of Nigeria. Nonetheless, the profitability of rice processing activities in Nigeria is analyzed by Aderibigbe (1997). In her study of Osun and Ogun states of SW Nigeria, the analysis of costs and returns to rice processing operations showed that there was considerable profit although net returns per month varied among respondents. In Ofada area (Osun state), net returns to rice processing was N3,811 while at Owode and Ilesa (Ogun state), it was N2,253 and N2,868 respectively per month. (see Table 12). It was observed also that unit returns to processing activities in the state were N3.17, N2.31and N3.05 per kilogram of rice processed in Ofada, Owode and Ilesa respectively. In addition, the study found that the unit net returns to processing activities increased with quantity of rice processed. This suggests that millers were achieving economies of scale in their rice processing operations and therefore should increase their levels of operations.

Table 11: Costs to Small Rice Milling Systems in Osun and Ogun States of SW Nigeria (Naira)

Locality	Labour	Transportation	Repairs/ Maintenance	Fuel/Electricity	Total
Ofada	561	998	481	991	3037
Owode	576	570	723	1247	3111
Ilesa	406	720	849	931	2785

Source: (Aderibigbe, 1997)

Table 12: Costs and Returns to Rice Milling Operations in Osun and Ogun States of SW Nigeria (Naira)

Locality	Quantity of rice processed (A)	Cost of processing (B)	Unit cost of processing (B/A)	Total returns (C)	Net returns (C-B)	Unit net returns (C-B)/A
Ofada	1202	3037	2.52	6848	3811	3.17
Owode	975	3111	3.19	5364	2253	2.31
Ilesa	941	2785	2.96	5653	2868	3.05

Source: (Aderibigbe, 1997)

4.2 Rice Marketing

Rice marketing is the performance of all business activities in the flow of paddy and milled rice, from the point of initial rice production until they are in the hands of the ultimate consumers at the right time, in the right place and as convenient as possible, at a profit margin so as to keep the farmer in his farming operations (Ihene, 1996). Seen from this perspective, Aderibigbe (1997) divided the marketing of local rice into four stages with a change of product ownership occurring between each pair of stages. The first stage is production through harvesting. Stage two include movement from the farms to processing centres while stage three consists of moving the milled rice from processing areas to urban consumption centres. The fourth stage encompasses wholesaling and retailing in the urban centres. The marketing of rice in Nigeria can also be classified into two broad systems (local and imported rice marketing systems) based on the source or origin of the rice supply.

4.2.1 Marketing of Imported Rice

The marketing of imported rice in Nigeria has undergone three major phases. In the first phase existing prior to 1976, the marketing of imported rice was solely handled by the private sector which purchased rice from outside the country and distributed the same to Nigerian consumers of rice. During this period, there was no intervention by the government in the marketing of imported rice. All the government did was to set the rules and regulations guiding rice importation such as the licensing of private agents before importation. A major problem of this phase however was the uncoordinated pattern of rice importation and distribution. This resulted in uncontrollable and haphazard pricing of rice throughout the country.

This situation gave birth to the second phase commencing in 1976 with the establishment of the Nigerian National Supply Company (NNSC) in 1976. This indeed was a direct government intervention in the marketing of rice in Nigeria as the NNSC was saddled with the responsibility of importing rice and other specified food items and distributing them to consumers at wholesale or retail and at tolerable, uniform prices (Oni and Ikpi, 1979). Between 1977 and 1986, about 80% of all rice imports to Nigeria were handled by the NNSC while the remaining 20% was handled by the private sector. Rice imported by the NNSC was distributed mainly to consumer co-operatives, retail grocery stores and supermarkets, large institutional consumers (like colleges, universities, hospitals, the army and hotels) and sparingly directly to individual Nigerian rice consumers. Rice importation and distribution was handled mainly by the NNSC until 1986 when importation of rice was banned by the federal government. However, it should be noted that despite the ban, imported rice still found its way into the country through Nigeria's porous borders.

During the third phase commencing after the lifting of the ban on rice importation in 1995, the importation, distribution and sale of imported rice was handled by the private sector.

4.2.2 Marketing of Local Rice

The marketing of locally milled rice in Nigeria has undergone three phases. During the first phase terminating in 1976, the marketing of locally milled rice was undertaken by private individuals. But during the second phase commencing 1977, a limited form of government participation in the marketing of rice and other cereals was introduced through the establishment of the Nigerian Grains Board. The board purchased milled and paddy rice directly from farmers and provided storage such that rice could be available in the market during non harvest periods. In the third phase commencing in 1986, private individuals were in full charge of the marketing of locally produced rice.

The main marketing channel of imported rice is directly from the importers to wholesalers and retailers. The retailers sell directly to the final consumers. The flow of imported rice directly from the importers to the household consumers is very minor. With respect to domestic rice, paddy rice flows mainly from the farmers to the assemblers and processors. The assemblers are commissioned agents who assist in purchasing rice paddy from the individual farmers either on behalf of the millers or to sell to them. They serve as the main link between the farmers and the processors. Rice paddy also flows in the main from the farmers directly to the manufacturers of livestock feed. From the processors, milled rice flows to the wholesalers, from wholesalers to the retailers who now sell directly to the final consumers.

The rural-urban price differential was less than 5% between north Kwara and Ilorin (100 km on good road), but 20% between Dekina and Ilorin (200km on bad road). Urban seasonal differentials were low, but rural ones high. In Bida, milled rice price remained constant in every month in 1982 at N630 per ton, while at Lemfa, a major rice producing area 80kms southwest of Bida, the price varied from N480 in the harvest months of January and February to N690 by July (i.e., 70%). In Anambra, price during harvest month was 86% of their July levels, compared with 30% for

green maize and 70% for yam. Rice seasonal price differentials are less than those of maize and yam because of its better storage capability.

4.2.3 Marketing Margin

There have been few detailed marketing studies done in the south since those in the 1980s supervised by Jones in the south west (Thodey, 1968) and the south east (Witney, 1968). Olayemi (1972) examined rice marketing and prices in Kwara state, central Nigeria, and found the following:

Producer share of wholesale price	69-75%
Wholesalers' margin (including return capital cost)	15-24%
Retailers' margin	6-10%

Ibezim (1985) estimated the marketing margins of rice by various participants in the marketing process in Uzo-Uwani and Nsukka local government area. The estimates which are presented in Table 13 indicates that for every ton of rice sold, farmers received a price of N791- corresponding with about half of the retail price paid by consumers. The difference between the farmer and consumer price is explained by the marketing costs and marketing returns for the various market agents or middlemen. Estimated marketing costs amount to 3.4% of the consumer price, whereas estimated marketing returns amount to 47% (N755). Wholesalers and retailers achieved the highest marketing returns of approximately 20% of the consumer price each.

Table 13: Marketing Margins Per Ton of Rice Sold by Participants in the Marketing Process in Uzo Uwani and Nsukka LGA, 1984.

Category	Farmers		Assemblers		Wholesalers		Retailers	
	Amount N/ton	Share (%)	Amount N/ton	Share (%)	Amount N/ton	Share (%)	Amount N/ton	Share (%)
Purchase price			791		909		1272	
Marketing cost	9	0.6	13	0.8	27	1.7	14	0.9
Marketing return			104	6.5	337	21.0	314	19.6
Selling price	791	49.4	909		1272		1600	

Source: (Ibezim, 1985):72. *Share* reflects the contribution of the item to final consumer price of N1,600 /ton (=selling price retailers).

The aforementioned marketing returns for the marketing agents of rice are quite substantial. In comparison, the same study also estimates the marketing costs and returns for maize that accrue to the various market agents. On aggregate these amount to 3.5% and 36% of the consumer price respectively – whereas producer and consumer price was N533 and N867 per ton respectively (Ibezim, 1985):71). With the exception of retailers, the breakdown over marketing costs and returns per market agent for maize are relatively similar to those for rice. Maize retailers obtain an estimated marketing return of 8.5% - which is substantially less than that estimated for rice (19.6%).

Iheme (1996) provides a more recent comparison of marketing margins of rice, maize and beans. This study reveals relatively similar marketing margins for rice (16%) and

maize (14%) when this is expressed on the basis of the respective consumer price. These margins (encompassing both marketing costs and returns) are substantially lower than in the earlier study by Ibezim (1985). In part these lower margins may reflect lower inflation levels of the 1990s.

Table 14 Marketing margins for rice, maize and beans in Enugu State

		Rice	Maize	Beans
Average farm gate price	N/50 kg	2,078	2,067	1,292
Average retail price	N/50 kg	2,478	2,411	1,663
Marketing margin	N/50 kg	400	344	371
	%	16%	14%	22%

Source: Iheme, 1996:49

5 Policy environment and rice sector development

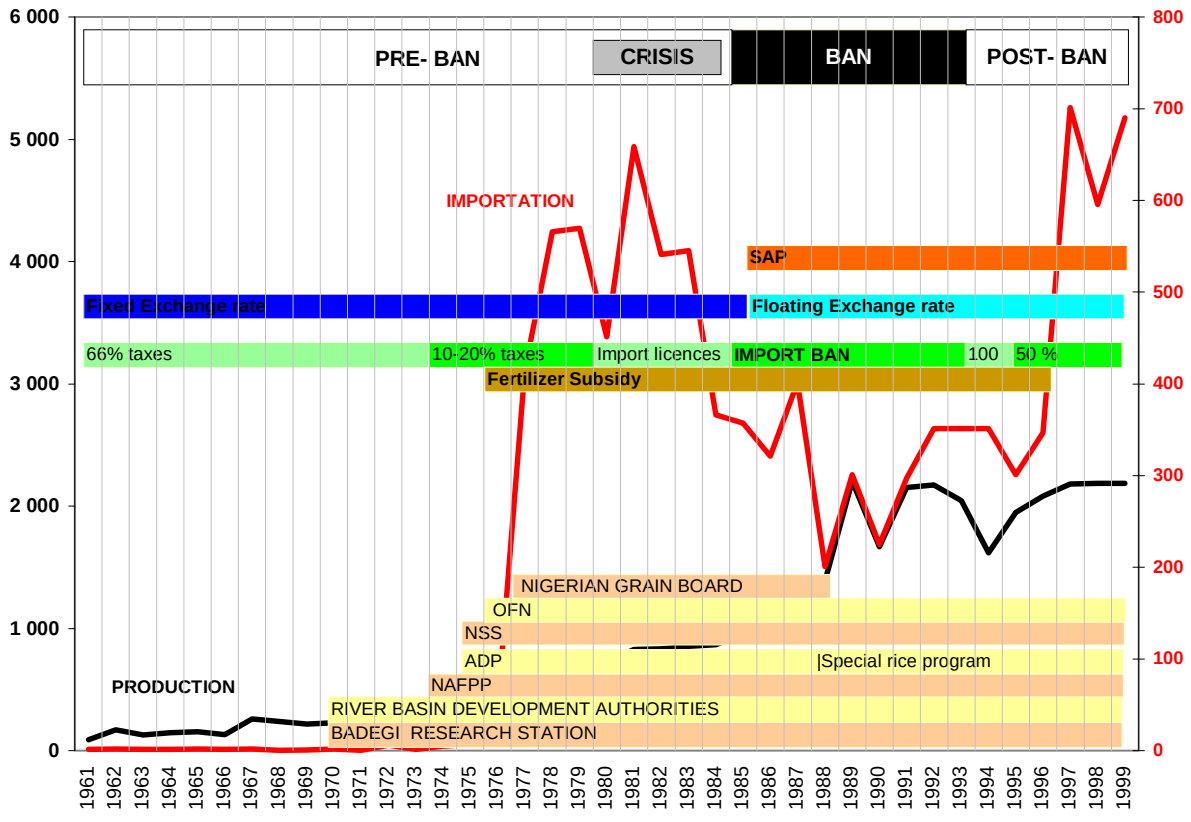
5.1 Changes and sequence in the policy environment

From an historical perspective, Nigeria's rice policy can be discussed in reference to three important periods (Figure 12). These are the pre-ban, ban and post-ban periods. These periods are critical as a result of the fact that the kind of policies put in place during these periods had profound impact on the rice economy.

The pre-ban period is the era prior to the introduction of absolute quantitative restriction on rice imports (i.e., 1971-1985). This epoch can also be classified in two – the pre-crisis (1971-1980) and the crisis period (1981-1985). The pre-crisis period was largely characterized by liberal policies on rice imports though ad hoc policies were put in place during times of interim shortages. It corresponds to the launching of various programs and projects aiming at developing the rice production. During the crisis period, more stringent policies were put in place, though outright ban was not a major feature.

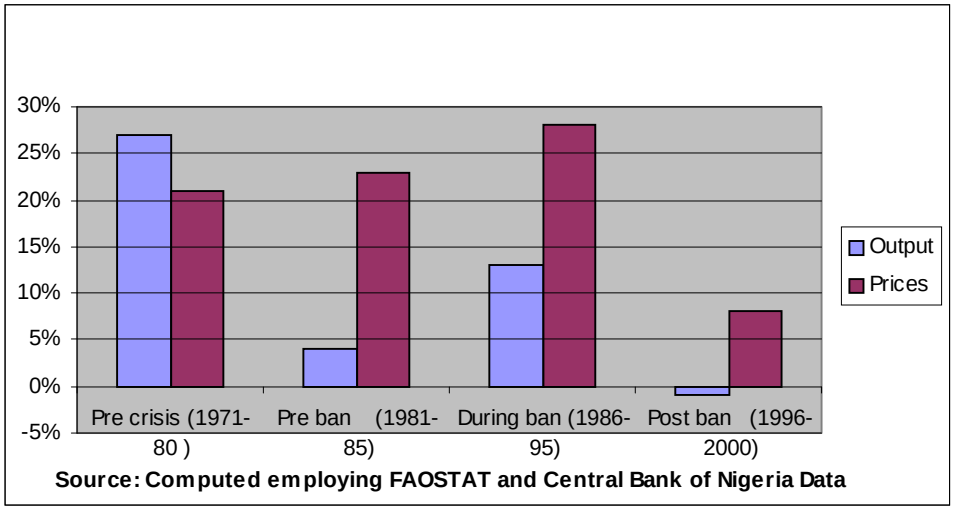
In the ban period (i.e., 1986-1995), it was illegal to import rice into the country though illegal importation of the commodity through the country's porous borders thrived during this period. In the post-ban period (1995 – date), quantitative restrictions on rice importation were lifted while the country generally adopted a more liberal trade policy towards rice.

Figure 12: Nigerian Rice policy sequence



The effect of trade policy on rice production in Nigeria can be determined by examining the growth in output before, during and after ban on rice imports. Figure 13 indicates that prior to the major crisis in rice production (i.e. 1971-1980), the average annual growth in rice output was 27%. However, this plunged to 4% during the 1981-85 period, a period when Nigeria relied considerably on rice importation. Nigeria imposed a ban on rice imports during the 1986-95 period. During this period, the average annual growth in rice production skyrocketed to 13%. But after the removal of the ban in 1995, the average annual growth dived to –1%. This tends to suggest a positive correspondence between government trade policies and rice production in Nigeria, conjecturing that rice farmers do indeed respond to government trade policies (especially the ban) on rice imports by increasing their output. If this is the case, the critical question then is, what was the channel through which trade policy affected domestic rice output during this period under observation? Was it through a reduction in imports or through a rise in the price of imported rice vis-à-vis local rice which then compelled Nigerians to purchase local rice? The imposition of a ban on rice imports is expected to result in decline in rice import. Rising demand for the limited imported rice available should result in an upward review in the price of the commodity. Even increased smuggling activities are not likely to keep the price of imported rice at its level before the ban. The increase in price of imported rice is envisaged to result in increased demand for local rice. Increased demand for local rice should lead to a rise in the price of the commodity which serves as an incentive for increased production of the product. Figure 13 tends to suggest that changes in the growth in producers prices of rice could have contributed to the changes observed in the growth in rice production. The figure reveals that an improvement in the growth in prices of rice during the ban period was associated with an improvement in the growth in rice output while a considerable decline in producer prices of rice after the ban was lifted in 1995 was followed by a plummeting in the output of rice.

Figure 13: Growth in Prices and Output of Rice



Source: Computed employing FAOSTAT and Central Bank of Nigeria Data

5.2 Rice development programs

Attention was not focused on rice during the pre colonial and colonial period. During this period, focus was rather on those export crops that could generate foreign exchange earnings to the colonial government. As a food crop, rice was comparatively less favoured than export crops such as cocoa, groundnut, rubber and palm produce. Thus, while export crops were supported through pricing and marketing board policies, rice and other food crops were left to develop at their own pace with no incentive.

5.2.1 National Cereals Research Institute (NCRI)

The attitude of the colonialist towards food crops production and rice in particular remained in vogue even after Nigeria attained independence in 1960. There was no specific commitment to the development of rice in the country. But the establishment of the Federal Rice Research Station (FRRS) at Badeggi in 1970 by the federal government signaled a major policy shift with respect to rice research in Nigeria. The development and multiplication of improved varieties of rice seeds for distribution to rice farmers was the major aim for the establishment of the FRRS. Although the station actually produced and multiplied some improved varieties, these seeds were not effectively distributed to the smallholder farmers who constituted the preponderance of rice producers in Nigeria. The result was that the effect of the station on rice production in Nigeria was not strongly felt (WARDA, 1981).

In 1974, the NAFPP, a cooperative programme between the federal and state governments and farmers in each state of the country was established. During this period, three crops research institutes were set up, the chief being the NCRI. This institute was mandated to carry out research on rice. The institute was expected to evolve high yielding varieties of the crop for trial on farmers' plots in three phases namely "minikit" or small plot phase of variety and fertilizer trials, to be followed by "production kit" on $1000m^2$ for selected crop varieties and finally mass adoption phase. The project was accompanied by the establishment of supporting services such as agro-service centres, on-farm adaptive research, seed multiplication and training of extension staff. However, the provision of production credit and marketing of produce were left in the hands of the farmers. The major problem was that of inadequate finance probably due to the low level of projected capital expenditure on agriculture during the Second National Development Plan period when the project was established. As at 1978, over 100,000 farmers participated and benefited from the NAFPP rice project. To date, NCRI has been able to develop various varieties of improved rice which have been introduced to farmers.

5.2.2 The National Seed Service (NSS)

In order to further boost food production in the country by complementing the NAFPP, with the assistance of the Food and Agricultural Organization, the Federal government established a National Seed Service (NSS) in 1975. The mandate of the NSS was to effectively coordinate seed production and certification for rice, maize, wheat, sorghum and millet throughout the country.

5.2.3 The Operation Feed the Nation (OFN)

In 1976, the Operation Feed the Nation (OFN) was designed as a strategy to bring about self- sufficiency in domestic food supply. With the commencement of this program came also some agricultural based incentives such as the introduction of subsidy on land clearing, seed and fertilizer supply, credit and mechanization. A total of 69 rural storage depots were commissioned to play a vital role in the proposed cooperative intra-and inter-state food marketing and distribution network. The OFN was successful to the extent that it gave political backing to agriculture and awakened the interest of many Nigerians in the age long profession. Unfortunately, the program made very little impact on food supply because it was directed at the wrong people. The subsidies went to a few elite while the peasant farmers who produce the bulk of the food eaten in the country were mostly neglected. A number of rice farmers who responded by increasing hectare devoted to the crop especially in Abakaliki area of the eastern states were not able to sell their produce due to the massive importation of cheaper and better quality rice during the 1977/78, a period when the tariff imposed on the commodity was lowest (10%). The program ahs since been moribund .

5.2.4 The River Basin Development Authorities (RBDA)

The RBDA was conceived in 1970 with original objectives of:

- providing large scale mechanized clearing and farming of land for farmers;
- constructing dams and bore-holes;
- supply of electricity;
- building agro-allied centres with workshops and tractor hire services;
- ensuring large scale multiplication of improved seeds;
- providing for large scale rearing of improved livestock and poultry and distribution to farmers

The first two RBDAs (Sokoto-Rima and Chad Basin) became operational in 1974. The number rose to eleven in 1976 and in 1983, an RBDA was created in each state with the exception of Lagos state. In 1984, the nomenclature of RBDAs was changed to River Basins and Rural Development Authorities (RBRDAs) following an extension of their functions to include all rural activities. Furthermore, the number rose to 18.

With respect to irrigated crop production within the RBDA areas of operations, no priority was given to rice compared to other crops. Farmers decide on the crops to grow based on the ecological adaptations, economic and cultural factors with respect to staple food and vegetable crops. In addition, most rice produced in Nigeria are rainfed type which are usually planted during the growing season. In areas where hydromorphic or swamp rice is grown natural swamps and fadamas subject to seasonal flooding are used.

Government policy towards the RBDAs has been highly inconsistent. For instance, during the pre-ban period (i.e., 1985), the RBRDAs were relieved of the function of direct participation in production so that they could focus on land preparation, irrigation and provision of inputs. In a re-organization that took three years to complete, the number of RBRDAs was reduced to 11 in 1986-88, having been increased to 18 a few years earlier. This was followed by a policy of privatization and commercialization in 1990-93. This policy relieved RBRDAs of their farm inputs

distribution functions and direct production in 1990, shrank their functions to provision of water in 1991. In 1993, the federal government enacted Decree 101 of 1993 which vested in the federal government ownership of all surface and underground water resources in Nigeria.

5.2.5 Agricultural Development Projects (ADP)

According to Omotayo, et al (2001), the basis for Nigeria's strong ADP was laid in 1953 when the World Bank sent its first mission to the country (World Bank, 1995). At that time, agriculture was the mainstay of the nation's economy. Nigeria's use of the World Bank assistance began in earnest with a series of enclave ADPs in Gombe and Funta in 1975. The enclave ADPs were implemented in limited number of communities in the states where they were located. The acclaimed success of these initiatives stimulated the establishment of more ADPs in Lafia, Ayangba, Bida, Ilorin, Oyo North and Ekiti-Akoko. The first state-wide ADPs in Bauchi and Kano states were launched in 1981 and in Sokoto in 1982. The achievements of these projects are well documented (see Idachaba, 1985; APMEU, 1987). These ADPs were implemented as Integrated Rural Development Programmes (IRDP). Contrary to many earlier attempts to increase food production by relying on state farms, the ADPs were designed to rely on the small farmers for that purpose (World Bank, 1988).

As a result of the early successes recorded in the enclave ADPs, the first Multi-State Agricultural Development Projects (MSADP I) (which can otherwise be called statewide agricultural development programme) were initiated in 1986. By 1989, two more phases of the Multistate ADPs (MSADP II and MSADP III) have been put in place. By 2001, the ADPs are located in virtually all the states of the federation. On a national scale, the ADPs were jointly funded by the World Bank (60%), the Federal Government of Nigeria (10%) and the respective State Governments (30%). The ADPs employed the Training and Visit (T & V) system.

The main elements of the ADPs were improved technology (and the means to get it to farmers), increased supplies of farming inputs (especially fertilizer), and extensive infrastructure improvements (especially rural roads and water supplies). The ADPs have been a major channel through which government policies on rice production were implemented. Though still in operation, activities of the ADPs have been drastically scaled down owing to the non-available of funds for operation. It should be noted that the World Bank, a major financier of the project, has withdrawn its financial commitments. This has provoked debates on the future of the ADPs..

5.2.6 The National Grain Production Programme (NGPP)

The drought that occurred in the early 1970s made the Federal government of Nigeria to commission a joint Federal Grain Storage Consultative Group and FAO Food Security Mission to design a grain production and storage scheme for the country. This was based on the realization of the fact that grains supplied about 50% of total calories available and about 43% of total protein available during 1973 and 1974.

The National Grain Production Company was then established by fiat in 1975 with a mandate to boost grain production to meet the nation's drive at achieving food self-sufficiency. The Nigerian Grains Board was also established in April 1977 to have

among other functions the role of purchasing and storing surplus or under-priced grains which are to be released to the market during off season for the purpose of stabilising prices and preventing farmers from selling below production costs.

However, while the recommendation of the Consultative Group and the FAO team was that the National Grains Production Company should have progressively hit a target of 250,000 tonnes capacity stock by 1980, only 80,000 tonnes was achieved by the company and the defunct Nigerian Grains Board by 1989. The states were also to operate buffer stocks and stabilisation programme but none has been able to meet the target set up in the report.

5.3 Macro- and sectoral policy

During the pre-ban period (i.e., before 1986), government policies had artificially lowered domestic rice and fertilizer prices relative to the world price level. This was achieved through:

- Massive importation of rice between 1975 and 1985 resulting in low price of domestically produced rice.
- Government involvement in the distribution, marketing of the imported rice with non-transfer of actual costs of marketing to consumers but rather absorbed by government.
- Protection of elite urban consumers at the expense of farmers leading to depressed farm gate prices
- Protection of producers through input subsidies such that actual input costs were not translated into production decision making process.

The ban on rice importation came into effect in 1985. It was anticipated to stimulate domestic production through increases in the price of the commodity. The belief was that the ban would create an increased demand for local rice. It was anticipated that increased demand would translate to higher prices for the commodity. This would serve as an incentive for the local producers to increase production. The introduction of the Structural Adjustment Program (SAP) in 1986 reinforced the ban already placed on rice import. Under SAP, various trade policies were put in place. This was in addition to the depreciation of the naira arising from exchange rate deregulation. The overvalued exchange rate had served as an implicit tax on rice producers as it cheapened imported rice relatively.

Special rice production scheme was introduced in 1986 by the ADPs to stimulate smallholder rice production scheme particularly in the Fadama and the valley bottom areas. The scheme which involved technology transfer and provision of production inputs [fertilizer, improved seeds, ITA 150 (upland) and ITA 180 (lowland) and agro-chemicals] as well as improvement in rice processing skills was coordinated by the then Federal Agricultural Coordinating Unit (FACU) of the Federal Department of Agriculture. Two internationally recruited rice production specialists were put in charge of the program.

Under SAP also, the Nigerian Agricultural and Cooperative Bank (NACB) set up in 1988 special credit schemes to boost rice production. Under the scheme, the number of loans granted for rice production increased from only 3 to 5,780 in 1989 while loan

volumes increased from N59,452 in 1978 to N20,217,100 in 1989. Increased emphasis was placed on loan to rice producers beginning from 1986.

5.3.1 Trade policy

Nigeria has employed various trade policy instruments such as tariff, import restrictions, and outright ban on rice import during the period of investigation (see Table 15). During the 1970s and early 1980s, increased export earnings coupled with the highly over valued naira exchange rate made it possible for Nigeria to finance huge food imports. The high naira exchange rate cheapened food imports and consequently helped to depress domestic prices. This constituted a serious disincentive to increased domestic food production, in particular rice. Apart from the protection of the infant domestic industries that were largely import dependent for their raw materials and machinery, very little was done to directly protect domestic agriculture. Large importation of food items especially rice was allowed into the country at relatively cheap prices. This eroded the competitiveness of domestically produced rice and served as major disincentive to rice farmers. According to CBN/NISER (1992), the index of bias in protection calculated as the ratio of aggregate producer prices of agricultural sector to that of manufacture ranged between 0.55 and 0.86 for the 1970s. This suggests that on the aggregate, returns on investment in the protected industries were much higher than in agriculture. On the other hand, the costs of production of farmers were rising despite appreciable subsidies granted on a number of farm inputs. However, with the introduction of SAP in 1986, considerable level of protection was shifted from those "infant" industries that refused to grow to domestic agriculture. The major policy instrument in this regard was the ban on food importation, especially competing grains such as rice. Consequently, the index of bias in protection changed in favor of agriculture.

The ban on rice import remained in effect till January 1995 when it was lifted. A number of reasons can be adduced for the lifting of the ban. There was external pressure from international financial organizations such as the World Bank and the International Monetary Fund (IMF) who argued that the ban on rice was not in consonance with the liberalization posture of the government. This was in addition to pressure from the World Trade Organization (WTO). On the domestic scene, the government failed in the implementation of the ban on the commodity. This is evidence by the major markets in Nigeria flooded with imported rice. These found their way into the country through the porous borders. There was no attempt to prosecute traders who sold imported rice. This was in addition to the pressure put on the government by those who had vested interest in rice importation and the urban elites who had a preference for the consumption of imported rice.

Since the lifting of the ban on rice imported, the government of Nigeria has resorted to the use of tariff measures. Table 15 shows that tariff of rice has increased from an average of 50% during the 1996 – 1999 period to 85% in 2001.

Table 15: A Taxonomy of Nigeria's Trade Policy on Rice

Period	Policy Measures
Prior to April 1974	66.6% tariff
April 1974-April 1975	20%
April 1975-April 1978	10%
April 1978-June 1978	20%
June 1978-October 1978	19%
October 1978-April 1979	Imports in containers under 50kg were banned
April 1979	Imports under restricted license only Government Agencies
September 1979	6 month ban on all rice imports
January 1980	Import license issued for 200,000 tonnes of rice
October 1980	Rice under general import license with no quantitative restrictions
December 1980	Presidential Task Force (PTF) on rice was created and it used the Nigerian National Supply Company to issue allocations to customers and traders
May 1982	PTF commenced issuing of allocations directly to customers and traders in addition to those issued by NNSC
January 1984	PTF disbanded. Rice importation placed under general license restrictions
October 1985	Importation of rice (and maize) banned
July 1986	Introduction of SAP and the abolition of Commodity Boards to provide production incentives to farmers through increased producer prices
1995	100%
1996	50%
1998	50%
1999	50%
2000	50%
2001	85%

Sources: Sutcliffe and Ayomike, 1986; Federal Government Budgets, 1984-1986, 1995-2000 SAP and the Nigerian Economy, 1987; http://oryza.com/africa/nigeria/index.shtml

5.3.2 Exchange Rate Policy

Before the introduction of SAP, exchange rate and foreign exchange allocation policies acted as a major source of price distortion and disincentive towards farming enterprises. Previous Nigerian governments had pursued exchange rate policies that kept nominal exchange rate constant, even in the face of widening and divergence between rising domestic inflation and relatively stable international price level. Between 1960 and 1970, the exchange rate was fairly right, especially when domestic inflation kept pace with international inflation and foreign exchange matched the level of domestic currency in circulation. However, with the advent of petro-dollars and monetary expansion in the 1970s, domestic inflation began to outstrip international inflation rate. The extent of over-valuation of the local currency was put at 100%

between 1970 and 1975; 200% between 1976 and 1979 and about 700-900% during the 1980-85 period (CBN/NISER, 1992).

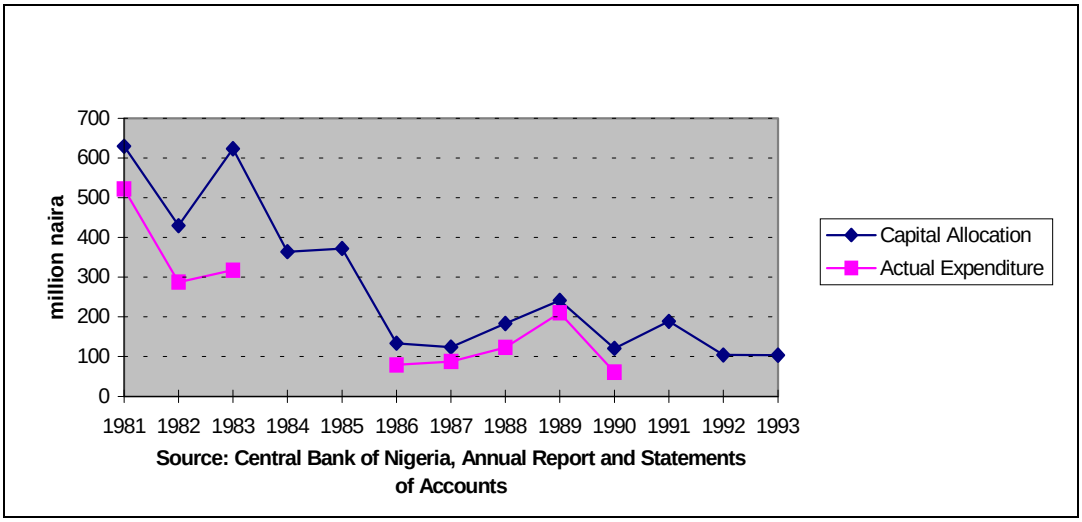
The consequence of the over-valued exchange rates altered the competitiveness and profitability of farm business in favor of other activities. With regards to imports (including rice), exchange rate over-valuation helped to cheapen imports of competing food items. For example, it was cheaper to import rice for domestic consumption than grow it locally. The situation was exacerbated by the liberal food imports policy, especially during the 1970-77 period when there was little or no tariff on imported food items. This fostered the rapid expansion in the importation of these goods (especially rice) to the detriment of local production of similar goods. Until 1981/82 when import restrictions were imposed, farmers producing staple food crops such as rice were actually subsidizing domestic consumers. The exchange rate devaluation, resulting from the implementation of SAP in Nigeria has resulted in dramatic increase in the naira price of imported food items and this was expected to discourage importation of foreign food items, by raising the level of effective protection for domestic production. However, the anticipated increase in rice production may be elusive given the skyrocketing prices of agricultural inputs. This is because most of the inputs employed in rice production are imported.

5.3.3 Fiscal Policy (Government Investment)

Public spending for agricultural development in Nigeria is undertaken mainly by the Federal and State governments. Such range of public sector efforts directed at promoting agricultural development can be classified into four categories. These include (a) direct expenditures of both tiers of government, (b) provision of credit for investment through public agencies, (c) direct credit by the Central Bank of Nigeria, and (d) a wide range of financial incentives and related assistance.

Before the ban period and the commencement of SAP and the disengagement of the government from direct agricultural production, government committed funds to agricultural production through the RBDAs. Figure 14 indicates that both capital allocations and actual expenditures to the RBDAs have been systematically declining since the beginning of the 1980s.

Figure 14: Capital Allocations to River Basins Development Authority

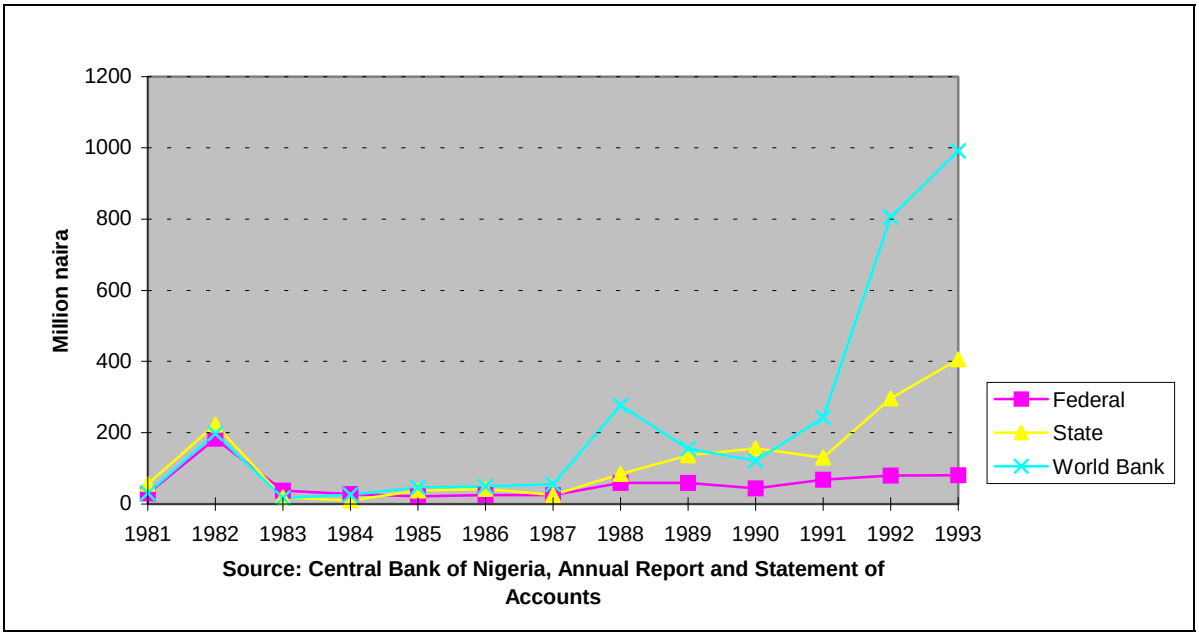


Besides the RBDAs, both federal and state governments also commit funds to the ADPs. Figure 15 shows that share of the federal government declined to 13.33% in 1986 while that of the World Bank rose to about 50%. Thus, though the total capital allocations to ADPs rose to N583.56 million in 1986-93 from N192.42 in 1981-85, that of the federal government declined to N55.10 million from N59.80 million. Although more recent data are not available, with the disengagement of the World Bank from the funding of the ADPs, it can be said that capital allocations to the project has also been declining. This has affected the commitment of the project to input provision and extension services.

The provision of credit for investment through public agencies especially under the Agricultural Credit Guarantee Scheme has provided substantial credit capital for investment in grains production in general and rice in particular. Table 16 shows that from 1991, the share of loans guaranteed to grains production in total loans increased substantially. During the 1990s, over 60% of total loans guaranteed to agriculture went to grains production. The table also shows that at least 15% of loans to grains went to rice production during the late 1980s. Although recent data on loans to rice production are not available, indications are that the share of rice in overall loans to grains has not changed remarkably.

A wide range of financial incentives (e.g., subsidy on farms inputs such as fertilizers, rice seeds and chemicals) also go from the Federal government to agriculture and rice in particular.

Figure 15: Capital Allocations to ADPs



Source: Central Bank of Nigeria, Annual Report and Statement of Accounts

Table 16: Loans Guaranteed Under the Agricultural Credit Guaranteed Scheme Fund (N' Million)

Period	Rice	All Grains	Total Agric.	Grains as % of total Agric. Loan Guaranteed
1978	0.05	2.27	11.28	20.12
1979	0.05	6.70	33.59	19.95
1980	1.33	3.74	30.94	12.09
1981	0.87	6.08	35.64	17.06
1982	0.87	4.92	31.76	15.49
1983	1.89	5.85	36.30	16.12
1984	0.55	3.37	24.65	13.67
1985	1.26	10.31	44.23	23.31
1986	4.12	31.05	68.41	45.39
1987	10.60	43.41	102.15	42.50
1988	17.25	62.25	118.30	52.62
1989	20.21	69.00	129.30	53.36
1990	13.94	58.07	98.49	58.96
1991	Na	50.53	82.10	61.55
1992	Na	64.38	91.95	70.02
1993	Na	56.63	80.84	70.05
1994	Na	72.09	103.18	69.87
1995	Na	106.61	165.16	64.55
1996	Na	151.70	197.20	76.93
1997	Na	152.01	242.02	62.81
1998	Na	140.15	215.69	64.98
1999	Na	146.13	246.08	59.38
2000	Na	223.28	361.45	61.77

Source: Central Bank of Nigeria Statistical Bulletin, Annual Report and Statement of Accounts

5.3.4 Fertilizer Policy

Nigeria has been largely an importer of fertilizer (see Table 17). Domestic production of fertilizer on a significant scale did not begin until 1987, long after a preliminary feasibility study on the possibility of local production of fertilizer commissioned by Nigeria and Indonesia in 1972. Although there are five fertilizer plants in Nigeria, the National Fertilizer Company (NAFCON) located at Onne, Rivers state is the major producer of fertilizer in Nigeria.

Prior to 1976, fertilizer procurement and distribution were handled by the states. But in order to boost agricultural production, the federal government took this responsibility off the states and introduced fertilizer subsidy in 1976. By this, fertilizer which was largely imported by the federal government, were distributed to the states for onward sales to the farmers at prices below the cost of importation. However, fertilizer subsidy has been an issue of intense controversy in Nigeria.

Fertilizer production in Nigeria has been constrained by politicking and ethnic rivalry. Moreover, some government officials have been more favorably disposed towards the importation of fertilizer from which large sums of money was swindled. Even importation itself has been fraught with a number of problems. There have been cases of imported fertilizer getting lost at the seaports. For instance, in 1993, only about half

of the fertilizer imported was delivered while the remaining got missing through pilfering and diversion. In 1994, 290300 tons of fertilizer was imported. Out of these, 11902 tons got lost at the seaports. Another 22062 tons got lost between vessels discharging and trucks loading while the actual deliveries to the final destinations were 84187 tons. This is a clear indication that apart from the huge sum of money involved in the importation, the business was fraught with fraud and irregularities.

Fertilizer subsidy in Nigeria has been criticized on a number of grounds. It has been argued that no matter how small the rate of subsidy is, it tends to shift attention away from needed developmental agricultural research and extension, rural water subsidies, small scale irrigation schemes and land development. In addition, fertilizer subsidy tends to create a dependency mentality or syndrome by which vested interests come to expect every regime to continue with the fertilizer subsidy scheme. Furthermore, fertilizer subsidy tends to crowd out other more important items in the agriculture budget. It tends to give a wrong impression of the "large" size of the agriculture budget when in actual fact it is the fertilizer subsidy that accounts for the bulk of the budget. Also, fertilizer subsidy will continue to crowd out the private sector and prevent the development of private sector capacities in fertilizer procurement and distribution. Finally, the lesson of the last 25 years is that Nigerian farmers are more concerned with fertilizer availability at the time and place they need it most than they are about fertilizer subsidy. This is in addition to the fact that it never benefits the intended beneficiaries (that is, the farmers).

When SAP was introduced in 1986, government began a gradual deregulation of fertilizer trade. This was partly a follow-up to the widespread malpractice in the distribution of fertilizer especially during the 1980s and early 1990s. In 1996 for instance, there was a severe shortage of fertilizers following the government's decision to suspend its importation. There were large scale diversions of available fertilizers from official distribution channels to the black market and in some cases to neighboring countries due to the high subsidy. Nigerian farmers for whom the subsidy was meant were constrained to buy from the black market for as high as N2000 per 50kg bag, compared to the officially pegged price of N160. Fertilizer import which hitherto was banned was lifted in 1997. However, the duty on fertilizer and a variety of agrochemicals was set at 10%.

Subsidy on fertilizer was completely removed in 1997 before the inauguration of the democratic government in May 1999. After the inauguration, however, the federal government re-introduced fertilizer subsidy to the tune of 25% in 1999. After six months of experimentation with fertilizer subsidy, the government came to terms with the position of experts that agricultural incentive in the form of subsidy was not the most appropriate way of solving the multifaceted problems confronting agricultural development in Nigeria given the peculiarities of the country's agriculture and people. As a result, the government had a rethink on the issue of fertilizer subsidy in particular and agricultural subsidy in general. Thus, in February 2000, government completely liberalized procurement, trade and distribution of agricultural inputs including fertilizer in Nigeria. By this policy, the federal government disengaged totally from the procurement and distribution of agricultural inputs, especially fertilizer. The authority to import agricultural inputs including fertilizer became vested in the hands

of private individuals and firms. In addition, duty on imports of agricultural machinery, spare parts and animal husbandry were slashed. Furthermore, the value added tax (VAT) on sale of agricultural inputs was abolished. At the same time, government promised to expedite action on the privatization of the Federal Superphosphate Fertilizer Company (FSFC) and the National Fertilizer Company of Nigeria (NAFCON) while also approving $14.09 million lifeline for the rehabilitation and modernization of NAFCON on the 29th of March, 2000. But in April 2001, government reintroduced fertilizer subsidy to the tune of 25% in 2001 (Mosadomi and Humbe, 2001). This amounts to about N3.5bn (Post Express, 2001).

Table 17: Fertilizer Supply in Nigeria (Tons)

Period	Import	Domestic Supply	Total Consumption
1961	1,394		1,394
1962	1,685		1,685
1963	2,093		2,093
1964	2,801		2,801
1965	3,649		3,649
1966	7,330		7,330
1967	7,261		7,261
1968	10,100		10,100
1969	10,405		10,405
1970	6,894		6,894
1971	9,245		9,245
1972	19,558		19,558
1973	17,600		17,600
1974	26,900		26,900
1975	53,300	1,000	54,300
1976	109,300	3,000	112,300
1977	71,900	4,100	76,000
1978	60,100	3,900	64,000
1979	102,600	5,700	108,300
1980	176,700	5,200	181,900
1981	203,700	9,500	213,200
1982	194,800	7,000	201,800
1983	259,600	4,200	263,800
1984	272,000	5,000	277,000
1985	375,200	5,000	380,200
1986	221,200	5,000	226,200
1987	262,500	78,000	340,500
1988	179,000	291,400	470,400
1989	219,400	324,400	543,800
1990	249,700	340,000	589,700
1991	207,100	318,600	525,700
1992	240,000	371,200	611,200
1993	281,000	330,000	611,000
1994	290,300	157,700	448,000
1995	23,700	138,900	162,600
1996	77,200	123,800	201,000
1997	91,500	46,200	137,700
1998	152,000	81,500	233,500
1999	117,600	85,500	203,100

Source: FAOSTAT, 2001

What can be deduced from the above discussions is that apart from the diversion of fertilizer subsidy to unintended beneficiaries, government policy on the input has been very inconsistent.

5.3.5 National Seed Policy and Seed Development Plan

A policy that stresses the importance of ensuring adequate supply of good quality seeds at affordable prices is currently in place. The major objectives of this policy is to provide a framework for future development of the seed sub-sector through:

- Establishment and governmental support of varietal improvement, registration, release and multiplication of released varieties;
- Re-organisation of both the public and private sectors involved in the seed industry; and,
- Encouragement of the private sector participation and take-over by the seed industry.

A seed development plan to implement the policy was articulated in 1992 and is being progressively implemented. The major components of this plan include:

- Policy/plan regulation and organisation; and
- Development of the seed industry.

To ensure proper regulation, the National Seed Council was established in 1992. The Council was "charged with responsibility for the overall policy guidelines and monitoring of the development of the national seed systems". The functions include:

- To analyze and propose programs, policies and actions regarding seed development and the seed industry in general, including legislation and research on issues relating to seed testing, registration, release, production, marketing, distribution, certification, quality, importation and exportation of seeds and quarantine regulations relating thereto;
- Propose improved management system and procedure relating to the administration of seed activity and advice the Government on the organisation, management and proper financing of seed programme;
- Analyse the market and prices of seeds;
- Control, supervise and approve the activities of the Crop Variety Registration and Release Committee; the Seeds Standard Committee; the Seed Industry and Skill Development Committee; and such other committees as may be established from time to time
- Advice the national research system on the changing pattern of seed demand and farmers needs;
- Monitor and evaluate the achievement of the national seed system and recommend improvements thereto;
- Encourage the formation or establishment in Nigeria of seed companies for the purpose of carrying out research, production, processing and marketing of seeds; and
- Perform other related functions as may be required of the council.

However, Omaliko (?) has criticized this policy as being inadequate. According to him, the policy has failed to adequately address such key issues as:

- The incessant problems of seed security which threaten continued existence of local land races much more in use by the local farmers within the country and the sub-region than the improved, released varieties. Furthermore, the policy failed to provide a necessary and functional framework for developing and providing interventions during cases of agricultural calamities;
- Development of either inter-country, sub-regional or regional co-operation programmes.

5.3.6 Land Policy

The importance of land to agricultural sector cannot be overemphasized. Land is the most primary natural resource of any nation, and on or under it lies all other resources that sustain the nation. In Nigeria, land provides the source of livelihood to about 90 percent of its population. This explains why the first law of society was land law.

Prior to the promulgation of the land use decree of 1978, different land law operated among the regions of the federation. In the Northern region, the land belongs to the state. The emirs and chief supervised the use of land and issued out certificates of occupancy. The people have the right to use the land but not to own it. But what operated in the Eastern region was slightly different. There are individually owned small pieces that are passed and shared by the sons of the father at death. Also, the communal lands were owned by the village, town or clan. The ownership of land in the Western region was a bit similar to that of the East. There are the communal (held on tribal, village, clan or family basis), collective (a group of people buy and share lands) and individual ownership. On the agricultural scene, millions of independent peasant farmers control their land and cultivate crops such as rice and a host of others on which they earn living.

But before 1975, when contributions of agriculture to GDP was consistently declining, experts observed that peasant agriculture was “the problem” to increased agricultural output. To remedy the situation, the land use decree was promulgated on March 29, 1978. This land decree did not alter the Northern region traditional land tenure system but changed the system that operated in the East and Western regions. The ownership of land in each state was vested in the state governments in trust for the people of the state. Through the land use decree, highly placed and influential government officials were able to acquire lands from their rightful owners at little or no cost thereby dispossessing peasant farmers of their land**.**

6 Conclusion & discussion

The present review has highlighted that a comprehensive overview of the rice economy was still missing – both in terms of its temporal and spatial dimensions. Nigeria is vast, diverse and dynamic with a multitude of agricultural and economic activities. Within this complexity, most studies tend to focus on particular systems or regions. Although the focus allows for more detail, there is a danger of losing the bigger picture.

The present review also highlights that a wealth of information already exists. However, it appears that the existing information is not fully exploited. In part, this seems to be related to unawareness and difficult accessibility. Another issue is different data collection methods used. Often it is difficult to assess the reliability of information (Is it an anecdote or fact?). This is particularly an issue as information from different sources often conflicts. Still, an additional effort is warranted to make better use of existing knowledge.

The Nigerian rice economy has seen some major changes in the political setting such as the lifting of the import ban in 1995. This change has major implications – yet still is relatively recent with only a limited post-ban period. This implies that for now only limited and partial information is available as not all effects have been documented or have fully materialized. Further scrutiny and monitoring of the implications under new setting is warranted – particularly in terms of documenting the effects of the ban; the dynamics; who gains and who loses.

In view of the ongoing changes in the socio-economic setting there is a need to regularly update the assessments of comparative advantage among crops, by location, by ecosystem and by technological option.

There is a need to assess the viability of irrigated systems. Substantial investments have made by the public sector in large scale irrigation schemes which were primarily intended for rice production. Given the retrenchment of the public sector, how can Nigeria make best use of these sunk costs? Another issue revolves around the viability of small scale irrigation schemes – amongst others in terms of investment, maintenance and operational costs. Can irrigated rice compete in a more liberal environment?

Input use also merits further attention. Fertitiliser has long been a highly political input – with varying degrees of subsidy. It remains unclear though how subsidy rates affected actual fertilizer use by farmers – for instance in terms of use rates and availability. Still, fertiliser use appears relatively widespread on cereals such as rice in Nigeria compared to other West African countries.

Indeed, the current review has highlighted a number of policy issues. First and foremost, there appears to be no clear policy strategy. The policy environment as it affects the rice economy is inconsistent and typically based on short term views. Indeed, institutional memory seems short and many policies reactive instead of proactive.

The impression exists that often there is no real analysis of situation. As a consequence, no clear policy position is taken – for instance in terms of how to develop the rice economy. A prime example is the import ban. It has been removed since 1995 – but there are no clearcut answers to the question why it was removed. Are other development measures of the rice economy justified and viable?

Another prime example of limited analysis is rice consumption. Why is local rice not well accepted? Who actually consumes the imported rice and why? The current review has seen much anecdotal evidence but no comprehensive analysis rice market so far.

The above elements also explain why some stakeholders maintain their old view. Many still seem to share the ideal of self-sufficiency in rice, and possibly even exporting rice. However, a real analysis could allow valuable lessons to be learned and provide arguments and facts to defend a particular policy position.

The current review of the state of the art of Nigeria's rice economy thereby raises a number of issues. Indeed, numerous information gaps have been identified which require further research. Some of the illustrative questions that remain are mentioned hereunder.

Production

- What is the current comparative advantage of the various states that produce rice?
- What is the level of state government involvement (directly and indirectly) in rice production?
- What is the relative profitability of rice production vis-à-vis other food crops?

Consumption

- What is the share of rice expenditure in total household expenditure?
- What is the level of rice consumption?
- What is the rice preference of Nigerians – imported or local and, what factors account for this?

Processing

- What kind of processing technologies are in use?
- What is the profitability of utilization of these technologies?
- What factors hinder the adoption of modern technologies?
- Is there sufficient reward for quality?

Marketing

- What are the various channels of rice distribution in Nigeria?

Input

- What is the level of involvement of state governments in input production and procurement?
- What role can government play in the production of rice inputs?
- How can the private sector be encouraged in rice input production?

Organization

- Why is there no rice farmers and millers association at the national level?
- How can such association be formed?
- What roles can the association play in the production and procurement of inputs for its members

7 References

Aderibigbe O,T. 1997. An Economic Analysis of Rice Processing and Marketing in Osun and Ogun States, Nigeria. Ph.d Thesis, Obafemi Awolowo University, Ile-Ife, Nigeria.

Adedipe,N.O., Bakshi,J.S., Odegbaro.O.A., Aliyu,A. (eds), 1996. Evolving the Nigerian Agricultural Research Strategy Plan: Agro-Ecological Inputs. The National Agricultural Research Project, Ibadan, 1-486 pp.

Akande, S. O. 1994. Inter-Regional Economic Competiveness in the Production of Food Grains in Nigeria. ii-206. University of Ibadan.

Akanji, B.O. 1995. Hedonic-Price Analysis of the Demand for Grain Crops in Nigeria: The Case of Rice and Cowpea. A Ph.d Thesis Submitted to the University of Ibadan, Ibadan, Nigeria

Central Bank of Nigeria/Nigerian Institute of Social and Economic Research. 1992.

Clark, P.A. et al. 1982. Off-odour in Nigerian Rice: Part 2: Field and Extension Studies, Tropical Science, Vol.24, No.3, pp.165-172.

Fabusoro, E. 2000. Analysis of Rice Farming System in Ogun State and its Implications for Extension Programme. 1-102. University of Agriculture, Abeokuta, Nigeria.

Fagade, S. O. 1997. Yield evolution at irrigated Schemes in Nigeria. 1-39. 1997. Rome - ITALY, FAO

Ibezim, U.M. 1985. Production and Marketing of Rice and Maize by Small Holder Farmers in Uzo-Uwani and Nsukka Local Government Areas of Anambra State. A Masters of Science Thesis submitted to the University of Nigeria, Nsukka, Nigeria.

Iheme, D.A. 1996. The Marketing of Staple Food Crops in Enugu State, Nigeria: A Case Study of Rice, Maize and Beans. An M.Sc. Thesis Submitted to the faculty of Agriculture, University of Nigeria, Nsukka.

Jones, W.O. The Structure Staple Food Marketing in Nigeria as Revealed by Price Analysis. Food Research Institute Studies, Stanford University, Vol.8, pp.95-123

Lagemann, J. 1976. Traditional African Farming Systems in Eastern Nigeria: Veltforum Veilag: Munchen

Ladebo, O.J. 1999. “Determinants of Adoption of New Technology among Rice Farmers in Ifo Local Government of Ogun State, Nigeria”. ACTA Universities Agriculturae et silviculturae mendelinae Brunensis, Vol.48

Mosadomi Wole and Victor Humble. 2001. “Federal Government Re-introduces Fertilizer Subsidy”, Vanguard: National Newsreel, April, 13. http://www.vanguardngr.com/09042001/nn5130401.htm

Nweke, F.I. and Winch III, F.E. 1979. Bases for Farm Resource Allocation in the Smallholder Cropping System of Southern Nigeria, IITA Disc. Paper 4/80, August.

Nwoye, M. U. 1997. The Economics of Rice Production by Small-Holder Farmers in Anambra State. University of Nigeria, Nsukka.

Ojehomon,V.E.T., Ojehomon,O., and Otitolaiye,J.O., 1998. Effect of rice processing technology on income of the rural women in Niger State, Nigeria. In: T.A.Olowu (Editor), Sustainable agricultural extension in Nigeria. Proceedings of the third annual national conference of the agricultural extension society of Nigeria 17-19 June 1998. AESON, Ibadan - Nigeria, pp. 56-62.

Okorji, E.C. and K.O. Onwuka. 1994. A Comparative Analysis of Costs and Returns of Non-Irrigated and Irrigated Rice Production Systems in Uzo-Uwani Local Government Area of Enugu State, Nigeria. Agricultural Systems in Africa, Vol.4, No.2

Okereke, O. 1991. Increasing Rice Output through Tractor Use in Anambra State, Nigeria. African Rural Social Sciences Research Networks, Issues in African Rural Development, 1991. Ed. Cheryl R. Doss and Carol Olson, pp. 282-301.

Olagoke, M.A. 1991. Efficiency of Resource Use in Rice Production Systems in Anambra State, Nigeria. African Rural Social Sciences Research Networks, Issues in African Rural Development, 1991. Ed. Cheryl R. Doss and Carol Olson, pp. 319-342

Olayemi, J.K. 1972. Rice Marketing and Prices: A Case Study of Kwara State, Nigeria. Bulletin of Rural Economics and Society, Vol.8, No.2, pp.211-220

Omaliko, C.P.E. (?) Nigeria Seed Industry and Its Potential Role in Food Security Within the West and Central African Sub-Region, http://www.fao.org/ag/agp/agps/georgof/Georgo14.htm

Omotayo Akin, Okey D. Chikwendu and Kola Adebayo 2001. “Two Decades of World Bank assisted Extension Services in Nigeria: Lessons and Challenges for the Future”, Journal of Agricultural Education and Extension, Vol. 7, No.3, pp.143-152.

Oni, C.A. and J.K. Olayemi. 1973. Economics of Rice Milling in Kwara and N.W. States: A Comparative Analysis. Bulletin of Rural Economics and Society, Vol.8, No.2.

Oni, S.A. and A.E. Ikpi 1979. “Rice Production and Marketing in Nigeria: An Economic Appraisal”, West African Rice Development Association Rural Development Series No.23, September, pp.27-35.

Post Express, 2001. “FG Fights Food Crisis with N3.5bn Fertilizer” http://allafrica.com/stories/200105250191.html

Shaib,B., Aliyu,A., and Bakshi,J.S., 1997. Nigeria : National Agricultural Research Strategy Plan 1996-2010. Department of Agricultural Sciences, Federal Ministry of Agriculture and Natural Resources, Ibadan, Nigeria, ii-335 pp.

Singh, B. N., Fagade, S., Ukwungwu, M. N., William, C., Jagtap, S. S., Oladimeji, O., Efisue, A., and Okhidievbie, O. 1997. Rice growing environments and biophysical constraints in different agroecological zones of Nigeria. Met.J.2 1, 35-44.

Spenser, D.S.C. 1979. Anambra-Imo States (World Bank) Rice Projects: A Strategy for Rice Milling and Marketing. WARDA.

Stuykers, J.A.F.M. 1982. Some Information about Local Rice Mills and the Rice Produced in the Bida Division, Northern Nigeria, Netherlands Journal of Agricultural Science, Vol.10, pp.297-303.

Thodey, A.R. Marketing of Staple Foods in western Nigeria, Vol.3, Stanford Research Institute

Ward, K.A. 1981. Profile of Rice Cultivation within the Bida ADP area, April.

Witney, A. 1968. Marketing of Staple Foods in Eastern Nigeria, East Lancing, Michigan.

Wudiri, B.B. and I.O. Fatoba 1992. "Cereals in the Food Economy of Nigeria" In Lawani, S.M. and T. Babaleye (eds), proceedings of the Workshop on Recent Development in Cereal Production in Nigeria, Durbar Hotel, Kaduna, 2-4 September, 1991,

West African Rice Development Association 1981. Rice Production, Marketing and Policy in Nigeria. Occasional Paper, No.3

West African Rice Development Association 2000. "The Nigerian Rice Economy in a Competitive World: Constraints, Opportunities and Strategic Choices", Concept Note Submitted to USAID

World Bank, 1988. "Rural Development: World bank Experience 1965-1986". A World Bank Operations Evaluation Study. The World bank, Washington D.C.

World Bank, 1995. "Nigeria and the World Bank Learning from the past Looking to the Future". The World Bank, Washington, D.C.

Annex 1 Selected statistics

Table 18 Rice Statistics for Nigeria, 1961-2000

Period	Area (hectares)	Output (tons)	Yield (tons/hectare)
1961	149,000	133,000	0.893
1962	218,000	257,000	1.179
1963	162,000	195,000	1.204
1964	179,000	220,000	1.229
1965	188,000	231,000	1.229
1966	160,000	199,000	1.244
1967	262,000	385,000	1.470
1968	235,000	353,000	1.502
1969	258,000	325,000	1.260
1970	255,000	343,000	1.345
1971	304,000	388,000	1.276
1972	237,000	447,000	1.886
1973	373,000	487,000	1.306
1974	269,000	525,000	1.952
1975	261,000	504,000	1.931
1976	172,000	218,000	1.267
1977	246,000	408,000	1.659
1978	292,000	515,000	1.764
1979	400,000	750,000	1.875
1980	550,000	1,090,000	1.982
1981	600,000	1,241,000	2.068
1982	600,000	1,250,000	2.083
1983	630,000	1,280,000	2.032
1984	650,000	1,300,000	2.000
1985	670,000	1,430,000	2.134
1986	700,000	1,416,322	2.023
1987	745,000	1,780,000	2.389
1988	1,041,000	2,081,000	1.999
1989	1,652,000	3,303,000	1.999
1990	1,208,000	2,500,000	2.070
1991	1,652,000	3,226,000	1.953
1992	1,664,000	3,260,000	1.959
1993	1,564,000	3,065,000	1.960
1994	1,714,000	2,427,000	1.416
1995	1,796,000	2,920,000	1.626
1996	1,815,770	2,909,230	1.602
1997	1,742,800	2,960,280	1.699
1998	1,840,630	2,999,570	1.630
1999	1,718,870	3,225,780	1.877
2000	1,594,840	2,960,280	1.856

Source: PCU, FMARD, Nigeria

Table 19: Nigeria's Self-Sufficiency in Rice Production (1961-1999)

Period	Rice imports (tons)	Rice imports ('000US$)	Domestic Output (Milled in tons)	Self – sufficiency*
1961	1,100	200	88,711	98.78
1962	1,600	350	171,419	99.08
1963	1,300	270	130,065	99.01
1964	1,000	250	146,740	99.32
1965	1,400	340	154,077	99.10
1966	1,275	346	132,733	99.05
1967	1,482	398	256,795	99.43
1968	315	72	235,451	99.87
1969	651	71	216,775	99.70
1970	1,749	190	228,781	99.24
1971	255	71	258,796	99.90
1972	5,890	1,680	298,149	98.06
1973	1,069	405	324,829	99.67
1974	4,805	2,379	350,175	98.65
1975	6,652	3,862	336,168	98.06
1976	45,377	32,138	145,406	76.22
1977	413,273	240,319	272,136	39.70
1978	563,848	306,630	343,505	37.86
1979	567,899	253,616	500,250	46.83
1980	450,000	245,000	727,030	61.77
1981	656,791	407,511	827,747	55.76
1982	539,442	290,079	833,750	60.72
1983	543,525	237,792	853,760	61.10
1984	365,000	165,000	867,100	70.38
1985	356,135	94,561	953,810	72.81
1986	320,000	80,000	944,687	74.70
1987	400,000	92,000	1,187,260	74.80
1988	200,000	55,000	1,388,027	87.41
1989	300,000	80,000	2,203,101	88.01
1990	224,000	60,000	1,667,500	88.16
1991	296,000	85,000	2,151,742	87.91
1992	350,000	96,000	2,174,420	86.14
1993	350,000	91,000	2,044,355	85.38
1994	350,000	100,000	1,618,809	82.22
1995	300,000	81,000	1,947,640	86.65
1996	345,500	130,000	2,082,374	85.77
1997	699,054	263,030	2,179,756	75.72
1998	594,057	223,524	2,184,425	78.62
1999	687,925	258,843	2,185,759	76.06

Source: FAOSTAT Database, 2001

*Self sufficiency is defined as the percentage share of domestic output in total rice consumption

Table 20: Rice Output and Yield in Nigeria by States, 2000

S/N	Zones	Output ('000 tons)			Yield (tons/ha)	
		Dry season	Wet season	Total	Dry season	Wet season
	NORTH WEST	**0.34**	**847.93**	**848.27**	**1.74**	**2.04**
1	KADUNA		597.73	597.73		2.60
2	ZAMFARA		19.20	19.20		0.87
3	SOKOTO		14.00	14.00		0.70
4	KEBBI	0.34	68.00	68.34	1.74	2.11
5	KATSINA		29.00	29.00		0.97
6	KANO		120.00	120.00		1.47
	NORTH EAST	**2.93**	**418.82**	**421.75**	**3.31**	**1.56**
7	BAUCHI		40.82	40.82		1.82
8	JIGAWA		19.00	19.00		0.90
9	YOBE		37.00	37.00		1.23
10	GOMBE		69.00	69.00		1.82
11	ADAMAWA	0.53	128.00	128.53	3.33	1.97
12	BORNO	2.40	125.00	127.40	3.31	1.36
	CENTRAL	**15.50**	**1,270.17**	**1,285.67**	**3.55**	**1.82**
13	BENUE	14.79	275.10	289.89	3.59	1.99
14	NASSARAWA		105.63	105.63		2.35
15	PLATEAU		63.88	63.88		2.16
16	KOGI		102.50	102.50		2.28
17	FCT		14.19	14.19		2.21
18	NIGER		473.30	473.30		2.30
19	KWARA		35.58	35.58		1.23
20	TARABA	0.71	200.00	200.71	2.84	1.00
	SOUTH EAST	**2.35**	**275.15**	**277.50**	**2.37**	**2.35**
21	RIVERS			0.00		
22	BAYELSA		87.45	87.45		2.18
23	IMO	0.55	0.16	0.71	1.90	2.67
24	ABIA		15.34	15.34		1.82
25	AKWAIBOM		0.18	0.18		1.48
26	CROSS-RIVER		0.15	0.15		1.50
27	ANAMBRA		27.00	27.00		2.16
28	ENUGU		30.00	30.00		3.00
29	EBONYI	1.80	114.87	116.67	2.56	2.53
	SOUTH WEST	**3.11**	**123.98**	**127.09**	**2.07**	**1.42**
30	LAGOS	1.44	2.50	3.94	2.40	1.56
31	OGUN		12.37	12.37		1.20
32	OYO		0.90	0.90		1.29
33	ONDO	0.12	45.00	45.12	2.46	2.09
34	EKITI	1.25	40.09	41.34	1.76	1.07
35	OSUN		13.00	13.00		1.44
36	EDO	0.30	8.00	8.30	2.13	1.60
37	DELTA		2.12	2.12		1.41
	NATIONAL	**24.22**	**2936.05**	**2960.28**	**3.05**	**1.85**

Source: PCU, FMARD, 2001

Annex 2 Major Features of Rice Varieties Cultivated in Nigeria

Time Frame (released period)	Production ecology	Variety Name	Growth duration (days)	Parents	Other
1985-89	Upland	ART 12	90-110	NA	Blast tolerant, Drought tolerant
before 1975	Rainfed Lowland /Irrigated	BG 79	120	NA	Earliest released shallow swamp. (41/2 - 5 months) water availabaility
1980-84	R/Lowland; Irrigated	BG 90-2	115-120	PETA*, TN1, REMADJA,	High yielding potential. Widely cultivated in all zones
1995-99	R/Lowland; Irrigated	Cisadane (FARO 51)	135-174	PELITAI 1, IR 789-98-2-3, IR 2157-3,	ARGM tolerant. Popular in South East
before 1975	R/Lowland; Irrigated	D114	115	NA	Fe++ toxicity tolerant
before 1975	R/Lowland; Irrigated	FARO 12	115	SML 140/10	Long grain, blast tolerant. popular in South Eastern States
	Irrigated	FARO 15	137	BG 79, IR 8	NA
1975-79	R/Lowland; Irrigated	FARO 18	120	Tjina	High blast resistance
NA	Irrigated	FARO 19		PETA 3, TN 1, TKM 6	NA
NA	Irrigated	FARO 20	124	NA	NA
before 1975	Irrigated	FARO 21	120	TN-1	Stiff strawed, non lodging
before 1975	Irrigated	FARO 23	135-140	PETA, TANGKAI ROTAN	Fe++ tolerant. Popular in Sout East
before 1975	R/Lowland; Irrigated	FARO 24	95-120	De Gaulle	Early to medium duration. Popular inthe Northern dry zones
1975-79	Upland	FARO 25	100-120	FAROX 56/30	Blast, RYMV resistant, very popular in S. West /S. East, Drought tolerant
NA		FARO 27	NA	IR 400-5-12-10-2, IR 662, -, -	NA
before 1975	Upland	FARO 3	115-120	Agbede	Earliest exotic line, Drought tolerant
1985-89	Irrigated	FARO 30	115-120	NA	High yield potential, N - responsive
1985-89	Irrigated	FARO 31	115-120	NA	High yield potential, N - responsive
1985-89	Irrigated	FARO 32	90-110	NA	High yield potential, N - responsive
1985-89	Irrigated	FARO 33	115-120	NA	Long grain, early blast and RYMV tolerant, widely grown in dry zones
1985-89	Irrigated	FARO 34	115-125	NA	Long grain, early blast and RYMV tolerant, widely grown in dry zones
1985-89	R/Lowland; Irrigated	FARO 35	125-135	BG 90-2*4, TETEP, -,	High yielding potential. popular in all zones
1985-89	Rainfed lowland	FARO 36	136	MAHSURI, IET 1444	NA
1985-89	Irrigated	FARO 37		TOX 494-3696, TOX 711, BG 6812	NA
1985-89	Upland	FARO 38	145-160	IRAT 133	Early, Drought / blast tolerant. Popular in Northern Guinea and Sudan Savanna zones

Time Frame (released period)	Production ecology	Variety Name	Growth duration (days)	Parents	Other
1985-89	Upland	FARO 39	110-120	IRAT 144	Early, Drought / blast tolerant. Popular in Northern Guinea and Sudan Savanna zones
1985-89	Upland	FARO 40	145-160		Drought tolerant, blast resistant
1985-89	Upland	FARO 41	135-140	IRAT 170	Blast tolerant, Drought tolerant
1985-89		FARO 43		63-83, IGUAPE CATETO, IET 1444/IR1416-131/LITA 506,	NA
1990-94	R/Lowland; Irrigated	FARO 44	131	SIPI 661044, SIPI 651020, -,	Early to medium duration. Popular in the Northern dry zones
1990-94	Upland	FARO 45	90-105	ITA 257	Drought tolerant. Popular in all the dry zones
1990-94	Upland	FARO 46	115-120	ITA 150	Good grain quality. Acceptale nationwide. Blast tolerance
1990-94	Upland	FARO 47		ITA 117	Tolerance to high Al++ levels
1990-94	Upland	FARO 48	90-105	ITA 301	Popular: high rainfall zone
1990-94	Upland	FARO 49		ITA 315	Popular: high rainfall zone
1990-94	R/Lowland; Irrigated	FARO 50	90-105	BG 90-2*4, TETEP, -,	High yield potential
before 1975	R/Lowland; Irrigated	FARO 7	140	NA	NA
before 1975	R/Lowland; Irrigated	FARO 8	135-175	MAS 2401	Fe toxicity tolerant
before 1975	R/Lowland; Irrigated	FARO 9	NA	SIAM 29	Long grain. Also popular in South Guinea savanna (Niger and Benue States)
NA		FAROX 317-1-1-1	NA	FAROX 233-6-1, 2547, -,	NA
NA	Irrigated	I KONG PAO	115-120	NA	NA
NA	Upland	IRAT 10	110-120	NA	NA
NA	Upland	IRAT 112	95-105	NA	NA
NA	Upland	IRAT 13	120	NA	NA
NA		ITA 216	NA	TOX 7-4-2-5-1, 63-83, -,	NA
NA	Upland	ITA 323	NA	TOX 1525 F2 (DW), NORIN 6, TOX 340 F2,	NA
NA	Upland	ITA 337	NA	TOX 1369-7, ELONI	NA
NA	Upland	MOROBE KAN	135	From Côte d'Ivoire	NA
NA	Upland	OS 6	135	From Zaire	NA
NA	Upland	TOX 1889 7 105 2 1	NA	TOX1369-7, ELONI, -,	NA

Source: http://www.fao.org/WAICENT/FAOINFO/AGRICULT/AGP/AGPC/doc/riceinfo/plantvar/nigvar.htm